JANE'S ATTACK SQUADRON

TABLE OF CONTENTS

ESRB RATING

EVERYONE – Violence

Everyone
As of January 1, 1998, the new "Everyone" designation will replace the "Kids to Adults" rating. Titles rated "Everyone (E)" have content that may be suitable for persons ages six and older. These titles will appeal to people of many ages and tastes. They may contain minimal violence, some comic mischief (for example, slapstick comedy), or some crude language.

Violence
Scenes or activities, which involve violent acts.

INTRODUCTION

Welcome to *Jane's Attack Squadron*! Get ready for the thrill of WWII air combat at its finest. You'll experience frantic dogfights, pulse-pounding dive-bombing raids, torpedo runs, tense bombing missions, and much more.

In any of the 15 flyable aircraft from the USAAF, RAF, or Luftwaffe, you will lead your squadron deep into enemy territory to strike at the heart of the opposition. You'll encounter enemy fighters, bombers, tanks, trains, anti-aircraft artillery (*AAA/FLAK*), naval units, and more. Play a single mission, an entire campaign, or multiplayer games with up to seven friends.

Jane's Attack Squadron brings the realism of World War II Europe to your PC through realistic graphics and challenging gameplay.

 ➢ 15 flyable fighters, fighter-bombers, and strategic bombers from three air forces.
 ➢ Mobile ground objects such as trains, tanks, transports, and boats present greater challenges to your bomb delivery skills.
 ➢ Multi-station bombers let you fly the plane, man the guns, and drop the ordnance in a single flight.
 ➢ Wingman, flight, and squadron commands put you in control during the mission.
 ➢ Static and dynamic specular lighting models recreate the atmosphere of 1940s Europe.
 ➢ Multiplayer for up to 8 pilots.
 ➢ Authentic pilot chatter and music from the period.
 ➢ 3D hardware acceleration. 32-bit color blending.

MAIN MENU

When you start the game, the main menu is the first screen you will see. By moving your mouse cursor over your selection and clicking the left mouse button, you can maneuver through the various User Interface (*UI*) screens within *Jane's Attack Squadron*. From the Main Menu, you can select what type of game you would like to play by clicking on the instrument panel at the bottom of the screen.

In the lower right-hand corner of the Main Menu, you will see a button marked **EXIT**. You will find a similar button on every screen of the UI. This button will be marked either **EXIT** or **CANCEL**, and will bring you back to the previous UI screen (*or exit the game if you're looking at the Main Menu*).

The Main Menu options are:

SINGLE MISSION   Play an individual, non-campaign, single-player mission
QUICK MISSION   Jump right into a simple dogfight - the user sets several variables and plays
MULTIPLAYER   Play in a game with other people
CAMPAIGN   Start one of the game's campaigns (series of missions)
PILOT TRAINING   Flight and Tactics training
REFERENCE   Get details about various objects in the game
GAME OPTIONS   Set many kinds of options about how the game runs
CREDITS   See the names of the *Jane's Attack Squadron* team
EXIT   Exit *Jane's Attack Squadron*

GAME TYPES

Jane's Attack Squadron has five types of game to play. Or, you can design your own missions in the Mission Editor. You have plenty of ways to get into the authentic action of the European Air War.

Quick Mission   Set a few parameters, and fly a mission right away
Single Mission   Fly one mission
Campaign   Fly one of four historical campaigns from the Axis or Allied side
Pilot Training   Learn about flight and combat tactics
Multiplayer   Join your friends via LAN or Internet in the same plane or in opposing air forces

MISSION/CAMPAIGN SELECTION SCREENS

Clicking on the **QUICK MISSION**, **SINGLE MISSION**, or **CAMPAIGN** buttons in the Main Menu will bring you to the Selection Screen for that particular type of mission.

SINGLE MISSION SELECTION SCREEN
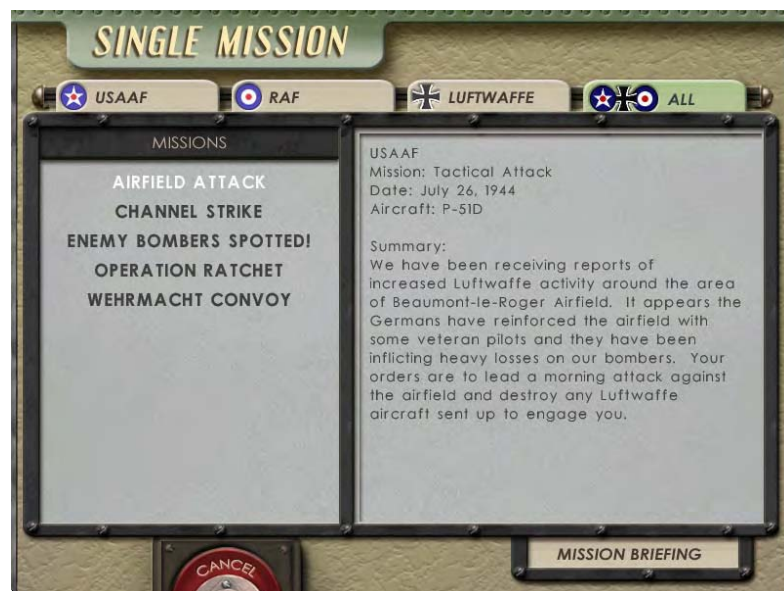
Single Missions are pre-made, individual (*i.e., not part of a campaign*) missions included with the game, which you can play at any time. They allow you to hone your combat skills within various scenarios without having to play through a whole campaign.

The Single Mission Selection Screen allows you to choose which mission to fly in Single Mission mode. Available missions are listed down the left side of the screen; clicking on a mission title will bring up a description on the right side of the screen. The description will tell you some background, and also what the goal of each single mission is.

By clicking on the tabs across the top of the screen, you can choose to see only the missions for a certain country, or you can see all the single missions for all countries by clicking on the **All** tab. You can fly missions for the **USAAF** (*US Army Air Force*), the **RAF** (*Britain's Royal Air Force*), or Germany's **Luftwaffe**.

To select a mission, click on the mission name in the list, and a summary will appear on the right side of the screen. If you want to play the selected mission, click the **MISSION BRIEFING** button while the mission you want is selected.

QUICK MISSION SELECTION SCREEN

The Quick Mission Selection Screen allows you to construct an instant mission from scratch. There are three main variables to consider when constructing a Quick Mission: Combat Environment, Friendly Flights, and Enemy Flights. By using the dropdown slots located under each heading, you can construct a unique mission, and multiple combinations offer endless possibilities. When you're done creating your mission, simply click on the **FLY!** button.

CAMPAIGN SELECTION SCREEN
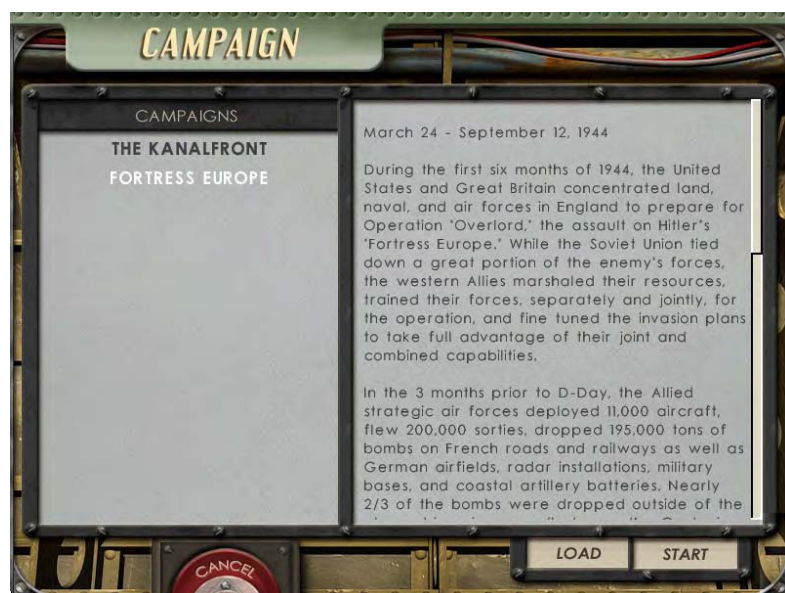
If you clicked **CAMPAIGN** in the Main Menu, you will see the Campaign Selection Screen. On the left-hand side of the screen, you can either select the **Kanalfront** campaign and fight for the Axis side, or select the **Fortress Europe** campaign and fly missions for the Allied side. Once you select a campaign, click **START** and you will be brought to the Mission Briefing screen. If you have already played part of a campaign previously and saved your game, you can click **LOAD** to load your campaign.

You must manually save your campaign before or after a mission. The game does not automatically save your place in a campaign!

MISSION BRIEFING SCREEN

The Mission Briefing Screens is where you will receive a full briefing on the mission you are about to fly. The mission briefing text will tell you the mission specifics and objectives. The buttons across the top of the screen can give you more information.

NOTE: Not all buttons are available in all mission types.

Roster	Shows the roster of pilots in the squadron for this mission
Reference	Brings you to the reference screen
Pilot's Log	See your statistics. Only available in Campaigns.
News	Check the latest headlines

When you're ready to fly the mission, click the **FLY!** button located in the lower-right section of the screen, or click **CANCEL** to return to the Single Mission Selection screen.

When you're playing a Campaign, you will be brought to the Mission Selection screen automatically after completing each mission (*after you've read the post-mission debriefing report on your performance*), and the next mission in the campaign will be automatically ready for you on the briefing screen.

SAVE/LOAD GAME BOX

Save/Load is only available while playing Campaign Missions. To save your progress in a Campaign, click **SAVE** in the Campaign Mission Briefing Screen. Click in the center of the first data box, enter the Save Game Name, and then click **SAVE**.

To load a Campaign, click on the **LOAD** button in the Campaign Selection Screen, select the desired Saved Game using your mouse, and then click the **LOAD** button.

MISSION DEBRIEFING SCREEN
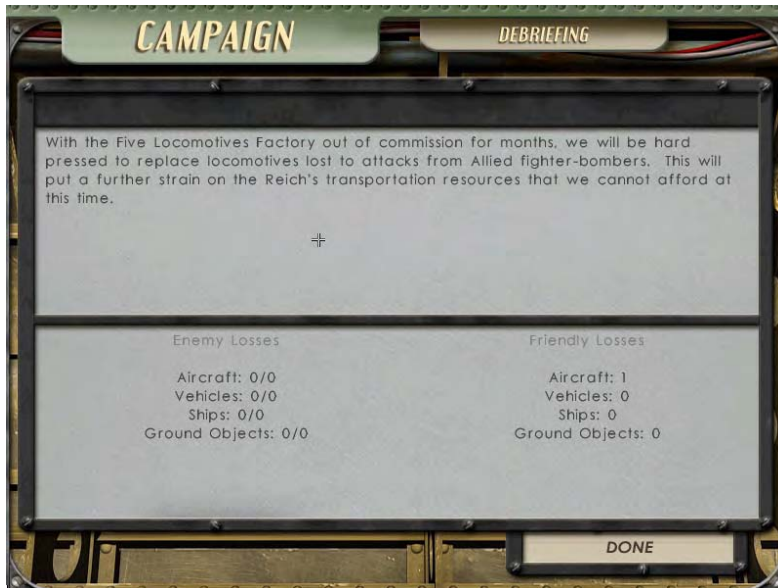
Once you have completed a mission (*either successfully or unsuccessfully*), you will be taken to the Mission Debriefing Screens. Here, you will see a tally of both friendly and enemy losses, as well as a brief summary of your performance.

Click **DONE** or **CANCEL** to exit this screen.

PILOT TRAINING SCREEN
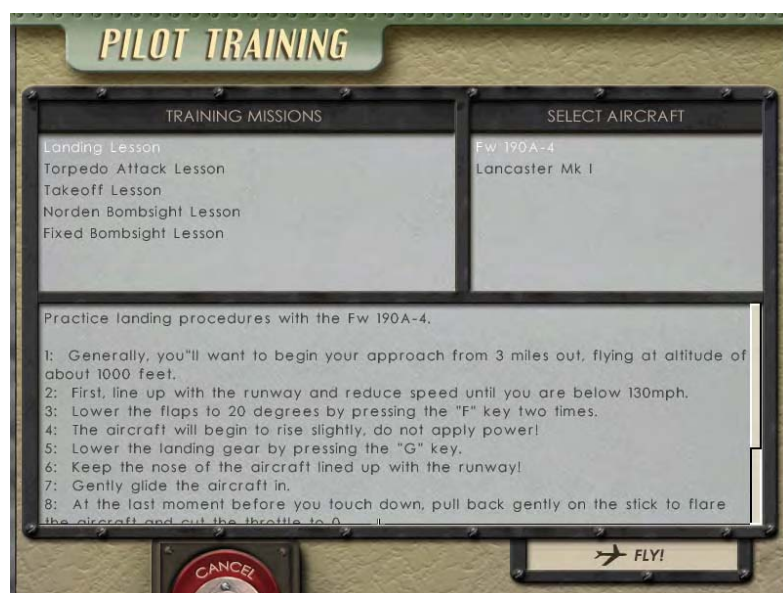
Jane's Attack Squadron includes Training Missions to acclimate you to all of the systems of the 15 flyable aircraft in the game. Each Training Mission focuses on a particular system or combat situation. Prior to beginning a campaign, it is worth your time to attempt each Training Mission at least once.

The five Training Missions focus on the following: Landing, Take-offs, Torpedo Attack, using the Norden Bombsight, and using the Fixed Bombsight.

To select a particular lesson, click on its title in the Training Mission window located in the upper-left section of your screen. Some Training Missions allow you the option of flying the lesson in several different planes. The planes available for each lesson will be listed in the Select Aircraft window, located in the upper-right of your screen. To choose a plane, simply click on the plane's name. It is advised that you complete each Training Mission with each of the available planes; after all, landing an Fw190A-4 fighter is quite a different experience than landing a German Lancaster Mk1 bomber!

The bottom half of the Pilot Training Screen contains a descriptive window, with Mission Instructions and a briefing for each Training Mission. The appropriate Instructions will appear in this window when a Training Mission is selected.

NOTE:
You can display these Instructions at any time during the Training Mission by pressing '**P**'.

REFERENCE SCREEN

On the Reference Screen, you can get additional information about all of the objects in *Jane's Attack Squadron*. To see the units in each category, press the corresponding tab along the top of the screen, either Aircraft, Vehicles, or Ships. To move to the next/previous unit, click the left and right arrow buttons above the **DONE** button.   To exit the screen, click the **DONE** button.

MULTIPLAYER SCREENS

Jane's Attack Squadron utilizes peer-to-peer multiplayer architecture. Up to 8 players are supported via LAN, TCP/IP, or an Internet matching service. While each *Jane's Attack Squadron* multiplayer game must have one player who acts as the host, if the host leaves the game another player in the game is automatically made the host.

To engage in a Multiplayer game, simply click on the **MULTIPLAYER** button in the Main Menu. Doing this will bring you to the Multiplayer Setup Screen.

MULTIPLAYER CONNECT SCREEN

In the Multiplayer Connect Screen, the player will **Select Connection Type** (*either Internet or LAN*) and **Select Game Type**. The player can choose to either Host a new game, or Join an existing game.

Clicking on the **PLAYER SETUP** button at the bottom of your screen will bring you to the Player Setup Screen. Here, you can enter your Callsign, Name, and Squadron. Players in the same Squadron will be on the same side, while other not in the player's Squadron will be considered enemies. Friendly fire is also an option however…

To enter your information, simply click in the designated box and type in your entry. Once you've entered your information, click on the **DONE** button to return to the Multiplayer Connect Screen.

If the player chooses to Join an existing Multiplayer game, clicking the **NEXT** button on the Multiplayer Connect Screen will bring you to the Multiplayer Game Startup Screen.

If the player chooses to Host a new game, clicking the **NEXT** button on the Multiplayer Connect Screen will bring you to the Multiplayer Host Game Setup Screen.

MULTIPLAYER HOST GAME SETUP SCREEN

In the Multiplayer Host Game Setup Screen, the player (*as Host*) can adjust the Game Settings, and limit the types of Aircraft allowed in his game.

Clicking on the **OPEN GAME** button in the Multiplayer Host Setup Screen will bring the player to the Multiplayer Game Startup Screen.

MULTIPLAYER GAME STARTUP SCREEN

When you Join a game, or have finished setting the options for a game you are hosting, you will enter the Multiplayer Game Startup Screen. The screen is divided into three sections.

The top half of the screen lists the players currently in the game and their status. The lower-left quadrant of the screen gives some information about the game, allows the host to select the "unlimited ammo" option, and lock the game from new players joining. The lower-right quadrant of the screen is the chat window. Messages you type in the chat line at the bottom of this window will be displayed to the other players in the lobby.

Also on this screen is the **SELECT AIRCRAFT** button. Pressing this button will bring you to the Multiplayer Select Aircraft Screen, while pressing the **READY TO FLY** button will enter you into the gameplay mode.

MULTIPLAYER SELECT AIRCRAFT SCREEN

In the Multiplayer Select Aircraft Screen the player will select the aircraft he would like to fly in the multiplayer game. All the available aircraft (*which the host has allowed in the Multiplayer Host Game Setup Screen*) are listed down the right side of the screen.

To choose an aircraft, simply click on the aircraft's name in the Squadron Info window. If you select a fighter, you will of course be the pilot and the only person in the plane. If you select a bomber, other players will be able to join your plane and fight with you as turret gunners in the various guns on the plane.

Or, if someone else in the game is already piloting a bomber (*"Sonny Boy" is piloting a B-24D, for instance*), you can choose to be a member of that bomber's crew. To do this, simply click on B-24D in the Squadron Info window, then click on "Sonny Boy's B-24D" in the Aircraft window. Finally, choose a crew position - perhaps Belly Gun? Or maybe Top Gun - in the Station Selection window. You can change guns as much as you want at any time in the game.

Clicking on the **DONE** button will return you to the Multiplayer Game Startup Screen, where you can then click on **READY TO FLY** and enter the game.

GAME OPTIONS

The Game Options button in the Main Menu will bring you to the Game Options Screen. Here, you can adjust a variety of settings for various gameplay, video, sound, and controller options.

➢ To set game options, click one of the buttons on the left. Then, set the options that appear on the right side of the screen.

➢ To return to the default game options, click DEFAULT.

➢ To accept changes and return to the Main Menu, click DONE.

➢ To return to the Main Menu without accepting your changes, click CANCEL.
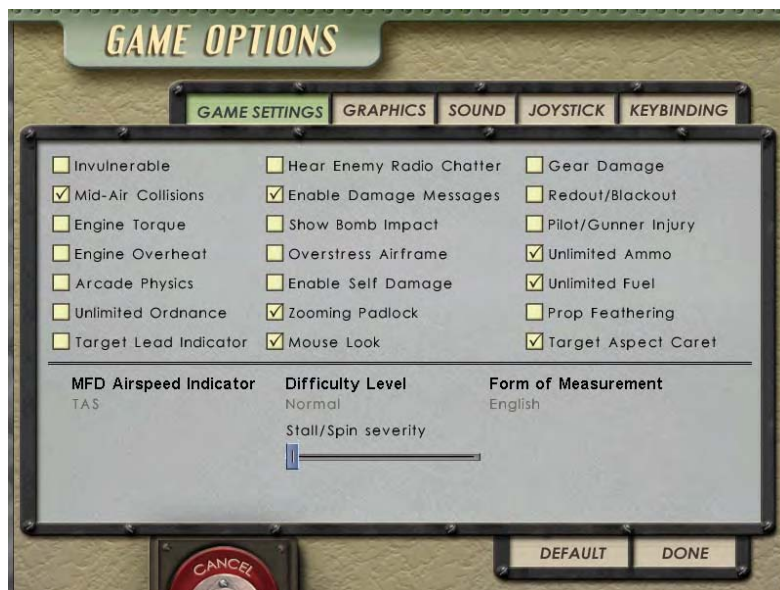
GRAPHIC DETAIL

To improve frame rate performance in the game, decrease or turn off these options:

OBJECT DETAIL   Use the slider bar to increase or decrease detail in the environmental objects.

CLIPPING/VISIBILITY   Use the slider bar to increase or decrease the depth of visibility in the game.

GAMMA CORRECTION   Use the slider bar to increase or decrease the gamma correction.

DISPLAY DRIVER   Choose your graphics display driver.

NOTE:
Jane's Attack Squadron automatically selects a display driver. Change the display driver only if you are having problems with your display.

VIDEO RESOLUTION   Click to change the display resolution. Higher resolutions slow the frame rate.

GAME SETTINGS

INVULNERABLE - Turning this option **ON** makes your plane invulnerable.

MID-AIR COLLISIONS - Turning this option **ON** allows the possibility of mid-air collisions.

ENGINE TORQUE - Turning this function **ON** allows Engine Torque to have an effect on your plane.

> *NOTE:*
> *"Every action has an equal and opposite reaction." An example of Engine Torque:*
>
> *Engine torque is the rotary movement of the engine. This movement turns the propeller, which then translates the rotary movement into forward thrust. As a plane sits on the runway with its engine roaring and propeller spinning, it will begin to pull slightly towards the direction that the prop is spinning, as a result of the twisting force of the engine.*

ENGINE OVERHEAT - Turning this option **ON** allows the possibility of your engine overheating.

ARCADE PHYSICS - Turning this option **ON** prevents stalls and/or spins from occurring in the game.

UNLIMITED ORDNANCE - Turning this option **ON** gives you an unlimited amount of Bombs, Rockets, or Torpedoes where applicable.

TARGET LEAD INDICATOR - Turning this option **ON** displays the Target Lead Indicator on the screen (*see 'Targeting Indicators,' below*).

HEAR ENEMY RADIO CHATTER - Turning this option **ON** allows the player to hear enemy radio communications, as well as his own.

ENABLE DAMAGE MESSAGES - Turning this option **ON** will allow text messages to pop up in the game, indicating any damage that the player has either sustained or inflicted.

SHOW BOMB IMPACT - Turning this option **ON** will display the Bomb Impact Indicator on the screen (*see 'Targeting Indicators,' below*).

OVERSTRESS AIRFRAME – Turning this option **ON** will allow the possibility of overstressing the airframe of your plane, which could then cause damage to the plane, including the loss of wings, etc.

ENABLE SELF DAMAGE - Turning this option **ON** allows the possibility of "Friendly Fire," giving you the ability to damage the other planes in your Squadron.

ZOOMING PADLOCK - Turning this option **ON** automatically zooms the camera in when a 'padlocked' enemy comes within close range of the payer's guns, thus assisting the player in choosing a specific location on the target to damage.

MOUSE LOOK - Turning this option **ON** allows the mouse to rotate the player's view.

GEAR DAMAGE - Turning this option **ON** allows the possibility of damage to your landing gear.

REDOUT/BLACKOUT - Turning this option **ON** allows the possibility of pilot redouts and blackouts due to overstress of the plane.

> *NOTE:*
> *For a description of pilot redouts and blackouts, see **Gravity: Physical Effects of G-Forces**, above.*

PILOT/GUNNER INJURY - Turning this option **ON** will allow the possibility of injury to personnel in your plane.

UNLIMITED AMMO - Turning this option **ON** gives you unlimited ammunition for Machine Guns and Cannons.

UNLIMITED FUEL - Turning this option **ON** gives you an unlimited amount of fuel.

PROP FEATHERING - Turning this option **ON** allows the player to make minute adjustments to the angle of his props, fine-tuning directional performance.

> *NOTE:*
> *For a list of associated keys, please review the **Janes Attack Squadron Keyboard Reference.doc** and the **Janes Attack Squadron Keyboard Command System.doc**, located on the **Jane's Attack Squadron** CD.*)

TARGET CARET INDICATOR - Turning this option **ON** displays the Target Caret Indicator on the screen (*see 'Targeting Indicators,' below*).

MFD AIRSPEED INDICATOR - Select the type of airspeed indicator for your MFD (Multi-Functional Display), either **TAS** (*True Airspeed*) or **IAS** (*Indicated Airspeed*).

> *NOTE:*
> *The Indicated Airspeed of an airplane will seldom be the same as the True Airspeed. True Airspeed indicates airspeed relative to a fixed point at sea level. As the plane's altitude rises, the air becomes thinner and does not offer as much pressure against the airspeed indicator. Therefore, the indicator reads less than the True Airspeed.*
>
> *To calculate True Airspeed, add 2 percent of the indicated airspeed for each thousand feet of altitude.*

DIFFICULTY LEVEL – This setting allows the player to select the level of difficulty in the game – Easy, Normal, or Hard. This selected setting influences how skilled the AI opponents in the **Jane's Attack Squadron** are, and how much damage is inflicted when the player is hit. On an 'Easy' setting, you and your allies do more damage to the enemy, and take less from them. On a 'Hard' setting, you and your allies do less damage to the enemy and take more from them.

FORM OF MEASUREMENT - Select how distance measurements are displayed, either ENGLISH (*using feet and miles*) or METRIC/German (*using meters and kilometers*).

STALL/SPIN INTENSITY – This slider allows the player to set the desired intensity of the engine stalls and spins that occur in **Jane's Attack Squadron**.

SOUND OPTIONS

SOUND EFFECTS   Turning this option **ON** enables the playback of sound effects in the game.

SUBTITLES   Turning this option **ON** allows pop-up subtitles for radio chatter.

SOUND THREADING   Turning this option **ON** may help smooth the playback of in-game sounds.
NOTE: Dual-processor machines may have problems with sound threading; if trouble should occur, try disabling disabling 'Sound Threading' in the Sound tab in the Game Options Screen it from the options panel.

MASTER VOLUME   This slider controls the overall volume of sounds in the game.

IN-GAME MUSIC   This slider controls the volume of background music in the game.

UI SOUND   This slider controls the volume of music and sound effects in the game shell.

ENGINE VOLUME   This slider controls the volume of engine noises in the game.

RADIO VOLUME This slider controls the volume of the in-game radio chatter.

JOYSTICK & FORCE FEEDBACK

ELEVATOR DEADZONE ADJUST   Use the slider bar to set the responsiveness of the flight stick to moving the joystick out of its deadzone (*pitch*).

RUDDER DEADZONE ADJUST   Use the slider bar to set the responsiveness of the flight stick to moving the joystick out of its deadzone (*yaw*).

AILERON DEADZONE ADJUST   Use the slider bar to set the responsiveness of the flight stick to moving the joystick out of its deadzone (*roll*).

FORCE FEEDBACK ENABLED   Turn ON/**OFF** force feedback in your joystick. When ON, select from the following force feedback options:

FEEDBACK COLLISION   Turn ON/**OFF** force feedback when you collide with another object.

FEEDBACK LANDING JOLT   Turn ON/**OFF** force feedback when you land your plane.

FEEDBACK GUN/CANNON   Turn ON/**OFF** force feedback when you fire your gun.

FEEDBACK ENGINE RUMBLE   Turn ON/**OFF** force feedback when the engine is on.

FEEDBACK ROCKET VIBRATION   Turn ON/**OFF** force feedback when rockets are launched.

FEEDBACK GEAR RUMBLE   Turn ON/**OFF** force feedback when the landing gear is raised or lowered.

FEEDBACK GROUND EFFECT   Turn ON/**OFF** force feedback when you are rolling on the ground.

FORCE FEEDBACK GAIN   Use the slider bar to set the amount of force feedback.

KEYBINDING

For a complete list of Hotkeys and Keyboard Commands, please review the **Janes Attack Squadron Keyboard Reference.doc** and the **Janes Attack Squadron Keyboard Command System.doc**, located on the *Jane's Attack Squadron* CD.

You can bind keys and combinations of keys to perform weapons, flight, and avionics functions. On the left side of the screen, select the set of functions that you want to map.

➢ To change the keys for a function, use the mouse to highlight and double-click the function. Then, press the key or keys that you want to map to that function.

➢ If the selected keys are already mapped to another function, click YES to override them. If you override, you have to reset a new keyboard shortcut for the other function.

> To return to the default keyboard configuration, click DEFAULT.

> To return to the Game Options screen, click DONE.

SYSTEM REQUIREMENTS

Jane's Attack Squadron requires the following minimum system specs:

- WIN98/ME/2000/XP 100% COMPATIBLE PC SYSTEM
- PENTIUM II 400 MHZ OR COMPATIBLE PROCESSOR
- 128 MB RAM
- 16 MB D3D VIDEO CARD WITH 16-BIT COLOR SUPPORT
- MS COMPATIBLE MOUSE
- DIRECT X 8.0 COMPATIBLE SOUND CARD
- 600 MB FREE HARD DRIVE SPACE
- 16X CD-ROM DRIVE

GAMEPLAY MODES

CAMPAIGNS

THE KANALFRONT

January 15 - May 23, 1943

This campaign takes place in 1943 as the Allies began to intensify their air attacks against Hitler's Fortress Europe. By this time, the Luftwaffe had moved away from the large scale bombing raids it pursued during the Battle of Britain and instead focused on sending smaller numbers of aircraft to attack English targets in the Channel and in Southern England.

While flying for the Luftwaffe, the player will be piloting fast single-engine fighter-bombers, such as the Fw-190 and Bf-109 and will be responsible for making pinpoint bombing raids against a variety of English targets. The player will also have the versatile Ju-88 medium bomber at his disposal. This aircraft could be equipped with torpedoes for naval attacks and with conventional bombs for low level tactical attacks (*against airfields and industrial targets*).

The player's goal in this campaign is to use the limited resources the Luftwaffe has committed to this front and try to inflict the maximum amount of damage. If the player succeeds then the Allies will be forced to divert more of their air resources into stopping these Luftwaffe attacks and will help buy the Third Reich more time.

FORTRESS EUROPE

March 24 - September 12, 1944

During the first six months of 1944, the United States and Great Britain concentrated land, naval, and air forces in England to prepare for Operation 'Overlord,' the assault on Hitler's 'Fortress Europe.' While the Soviet Union tied down a great portion of the enemy's forces, the western Allies marshaled their resources, trained their forces, separately and jointly, for the operation, and fine-tuned the invasion plans to take full advantage of their joint and combined capabilities.

In the 3 months prior to D-Day, the Allied strategic air forces deployed 11,000 aircraft, flew 200,000 sorties, dropped 195,000 tons of bombs on French roads and railways as well as German airfields, radar installations, military bases, and coastal artillery batteries. Nearly 2/3 of the bombs were dropped outside of the planned invasion area (*between the Contenin Peninsula and the mouth of the Orne river*) in hopes of leading the Germans to believe the invasion would land at Pas-de-Calais across the narrows of the Channel. Two thousand Allied aircraft were lost, but the air campaign succeeded in destroying all the bridges across the Seine and Loire rivers and thus isolating the Normandy Invasion area from the rest of France.

Though D-Day was set for May of 1944 in Washington, the logistics of assembling landing craft delayed it until June, at which point Eisenhower set June 5th as the unalterable date of invasion. As troops began to embark for the crossing bad weather set in and Eisenhower reluctantly agreed to a 24-hour delay. D-Day was set: June 6th, 1944. An armada of 3,000 landing craft, 2,500 other ships, and 500 naval vessels (*escorts and bombardment ships*) crossed the English Channel overnight. Preceding them, 822 aircraft, carrying parachutists or towing gliders, roared overhead to the Normandy landing zones. They were a fraction of the air armada of 13,000 aircraft that would support D-Day.

Throughout the summer of 1944 the Allies began to retake mainland Europe, slowly forcing back the Nazis entrenched in Western Europe and the walls of Hitler's Fortress Europe. Allied fighter-bombers provided air cover for the advancing ground troops, helping turn the tide against the German panzer troops while the Allies pursued strategic bombing runs against outlying Nazi outposts to push the front line back to Berlin."

MISSION TYPES

Jane's Attack Squadron offers a wide variety of mission types to test every aspect of combat flying. Depending on the scenario and style of game, you can fly any of these types of missions.

TACTICAL GROUND ATTACK (TGA)

Destroy a ground target. You can use unguided rockets, guns, or bombs to strike at ground targets. For targets on water, torpedoes are most effective.

COMBAT AIR PATROL (CAP)

Patrol an area. Provide protection for all friendly units by engaging enemy air forces that start or enter the patrol area.

ESCORT (ESC)

Protect friendly aircraft tasked for reconnaissance or strike missions. Defend aircraft against enemy interceptors.

INTERCEPT (INT)

Prevent an enemy flight group from reaching its target. Often, interceptions require the engagement and defeat of enemy escort fighters before you can strike at enemy bombers.

NAVAL ATTACK (NA)

Attack and sink enemy naval units. Be warned: some ships have sizeable anti-aircraft defenses and can call in airborne support.

SCRAMBLE

Enemy aircraft inbound! Jump into your plane, get into the sky, and stop the enemy before he strikes at your home airfield.

STRATEGIC BOMBING/GUN CREW (SB)

Destroy vital infrastructure in the enemy's territory. These missions can require flights deep into the enemy's homeland and across significant defenses; many do not return.
➢   In the multi-station bomber, you can fly the plane, man a gun, and release ordnance.

SPECIAL

Who knows what's going to happen on a special mission?

PLAYER LOG BOOK

A player can access the Player Log Book by clicking on that button in the Campaign Mission Briefing Screen.

During the course of a campaign, the player's statistics are tracked and stored in the Player Log Book., and each mission the player has flown in the campaign appears on a separate line in the log. Under the heading of **Flight Log**, we record the following data:

Date - What is the mission date? (*ie, August 8, 1944*)

Pilot – Who was the pilot that flew the mission?

Mission - Which Campaign mission was flown?

Squadron - What Squadron did the pilot belong to?

Under **Campaign Stats**, we find:

Aircraft - What type of plane was flown on this particular mission?

Outcome - Was the mission a success or a failure?

Air Kills – How many enemy planes were destroyed by the player?

Vehicle Kills – How many enemy Vehicles weredestroyed by the player?

Ship Kills – How many enemy Ships were destroyed by the player?

Gound Kills – How many ground objects (*trucks, tanks, buildings, etc.*) were destroyed by the player?

The player's statistics are tracked from mission to mission only while flying in a Campaign.   After playing a Single Mission or a Quick Mission, the player is presented with his mission statistics on the Mission Debriefing screen, but the statistics are not accumulated or stored in the Player's Log Book.

MULTIPLAYER GAMES

Jane's Attack Squadron features a robust multiplayer system. Up to 8 players can join in a combat environment via LAN or Internet connections. While each game requires a host, the host can leave at any time without disrupting continuity; another player automatically becomes the host. An in-game chat system lets you taunt the opposition or plot tactics with your wingman.

DOGFIGHT

Get it and duke it out in Deathmatch-style sessions. These dogfights can involve any combination of aircraft type and number in the game. The objective: kill your opponent without getting killed.

MULTI-STATION BOMBERS

One of the most interesting features is the ability to fly in the same multi-station bomber with your friends. While one flies the plane, the others can man the gun stations, as you struggle to conquer your enemy. For more information, see **Multiplayer Select Aircraft Screen**, above.

PILOTING

MOVEMENT VECTORS

In three-dimensional space, there are three movement vectors:

PITCH is the vertical movement of the aircraft's nose up or down relative to the wings. When you pull back on the stick, you angle the aircraft's elevators up, causing the nose to pitch up.

YAW is the side-to-side rotation of the aircraft's nose relative to the center of the aircraft. Yaw changes the direction of horizontal flight but does not affect altitude. Move the rudder left or right to change the yaw.

ROLL is the tipping of the wings up or down. The aircraft maintains its current direction of flight. Roll occurs when you push the stick left or right, causing one aileron to angle down and the other to angle up. Lift is increased under one wingtip and decreased under the other, creating roll.

BANK You can combine pitch and roll movements to make a banking turn. By pulling the stick back (pitch) and pushing it to the right (roll), you cause the aircraft to make a banked turn to the right. A banked turn changes both the angle of the nose and the direction of flight.

A banked turn decreases lift and airspeed. To preserve your altitude and energy, apply extra throttle before a banked turn.

CONTROLS

In *Jane's Attack Squadron*, your plane is controlled by a combination of Keyboard Commands and the use of a Joystick.

HOTKEYS / KEY COMMANDS

For a complete list of Hotkeys and Keyboard Commands, please review the **Janes Attack Squadron Keyboard Reference.doc** and the **Janes Attack Squadron Keyboard Command System.doc**, located on the *Jane's Attack Squadron* CD.

THE JOYSTICK

The Joystick is the main tool used to pilot a plane in Jane's Attack Squadron. The Joystick can also be used to fire weapons, drop bombs, and release torpedoes. Here is a brief rundown of the Joystick controls:

Pulling back causes the plane to **climb** (*changes pitch*).
Pushing forward causes the plane to **dive** (*changes pitch*).
Twisting the joystick (*either Left or Right*) **changes the yaw** of the plane.
Moving the joystick to the Left (or Right) causes the plane **roll Left** (*or Right*).
Button 1/Trigger will fire the selected Guns or Cannons.
Button 2 will release the selected payload of bombs (*or fire the selected salvo of Rockets*).

The Joystick Wheel can be used to increase or decrease a plane's throttle.

The Hat Switch can be used to rotate your view (*see **Views**, below*).

CONTROL SURFACES

All control surfaces rely on the principle of lift, yet each movable surface applies lift forces in a different direction. These forces act either independently or in conjunction with one another to produce plane maneuvers.

ELEVATORS

Elevators are flat, hinged surfaces on the horizontal part of the tail assembly. While the tailplane surface stabilizes the aircraft during flight, the elevators apply pitch to the plane by angling the rear edge of the tailplane up or down.

To create pitch, pull the flight stick back or push it forward. Don't push or pull too quickly, as you can lose airflow across the wing, which may result in a stall. Stalls often happen during steep climbs.

RUDDERS

The rudder is the vertical component of the tail assembly. A hinge on the rear half of the vertical tail section allows it to angle left or right. When you apply rudder, you angle the tail section, which redirects the aircraft's nose either, left or right.

Applying left rudder yaws the nose to the left, while applying right rudder veers the nose to the right. Note that applying rudder also produces a slight rolling movement, which can be negated by pushing the stick in the opposite direction.

AILERONS

Ailerons are thin, hinged surfaces on the trailing edge of each wing. They angle in opposite directions to roll the aircraft. If you apply stick left or right, one wing's aileron angles down and the other angles up. This rolls one wing up and forces the other wing down, effectively rolling the airplane.

FLAPS

Similar to ailerons, flaps are thin, hinged surfaces on the trailing edge of the wing that are located close to the body of the plane. A raised flap conforms to the wing's natural shape. A lowered flap changes the wing's aerodynamic shape and increases the speed of the air across the top of the wing, thus adding lift. You extend flaps during takeoff to gain additional lift, and then retract them during flight to maximize your airspeed. Flaps increase your aircraft's angle of attack yet also increase drag.

Flaps can only be extended at low to medium speeds. If the aircraft is traveling too fast, the airflow over the flaps causes drag. In high-speed dives, flaps become unusable.

AUTOPILOT

By pressing the **'A'** key, you can toggle your plane's Autopilot feature on and off. When Autopilot is engaged, your plane will automatically maintain a correct course, and make the proper adjustments to bring you to your next mission waypoint. Autopilot cannot be engaged in Mulitplayer or Quick Missions.

Autopilot is particularly useful for bombing missions. For more information on this, please see **Combat**, below, or play through the Training Missions provided in the Pilot Training portion of ***Jane's Attack Squadron***.

VIEWS

Jane's Attack Squadron offers the player a number of different views, both internal (*from inside the player's cockpit*) and external (*from outside of the player's plane*). As you play, you can easily change your view; some views are more advantageous than others, depending on the situation you find yourself in. Certain views enable the player to zoom in or out (*using either the mouse or keyboard*), or rotate (*using the Joystick Hat Switch*). The *Jane's Attack Squadron* camera will remain in the last selected view until another view is chosen.

A player can jump between views by using the appropriate Hotkeys. For a complete list of Hotkeys and Keyboard Commands, please review the **Janes Attack Squadron Keyboard Reference.doc** and the **Janes Attack Squadron Keyboard Command System.doc**, located on the *Jane's Attack Squadron* CD.

FORWARD COCKPIT VIEW

The Forward Cockpit View is the default view in *Jane's Attack Squadron*. This is a first-person view (*from the pilot/player's perspective*), rendered from inside the cockpit. Zooming in or out will allow you to view the cockpit controls and instrument panel, and rotating will allow the player to "look around."

FORWARD VIEW

The Forward View is also a first-person view from the player's plane, but there is no cockpit; it is just a clean view from the front of the plane. The player can zoom in The Forward View, but cannot rotate.

CHASE VIEW

The Chase View locks the camera behind the player's plane. There are two types of Chase Views: The Floating Chase (*which starts close to the player and then pulls back*), and the Fixed Chase (*which does not pull back*). Zooming is available in the Chase View, but rotating is not.

PLAYER EXTERNAL VIEW

The Player External View is simply that: a view of the player's plane, from outside of the cockpit. The player is able to rotate 360 degrees around his plane, and can zoom in or out, enabling him to have a spectacular view of the *Jane's Attack Squadron* aircraft.

ENEMY OBJECT VIEW

The Enemy Object View displays the nearest enemy object, whether it's a plane (*as above*), boat, building, or truck. Reselecting this view will cycle through nearby enemy objects, ranking them by distance to the player.

FRIENDLY OBJECT VIEW

The Friendly Object View displays the nearest friendly object. In the screenshot above, we see our wingman flying in a plane called "Black Cat." As with the Enemy Object View, reselecting this view will cycle through nearby enemy objects, ranking them by distance to the player.

FLYBY VIEW
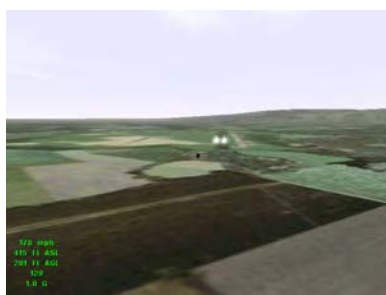
The Flyby View gives us third-person flyby shot of the player's plane or the selected target.

TACTICAL CAMERA VIEW

The Tactical Camera View is a third-person view that stretches <u>from the player's plane</u> to the selected target.

INVERTED TACTICAL CAMERA VIEW

The Inverted Tactical Camera View is a third-person view that stretches <u>from the selected target</u> to the player's plane.

WEAPON CAMERA VIEW

The Weapon Camera View locks the camera on dropped ordnance, and follows it down as it makes its way to the target.

"BIRD'S EYE" WEAPONS CAMERA VIEW

The "Bird's Eye" Weapons Camera View also follows dropped or fired ordnance as it makes its way towards a target, but here the camera is from the bomb's (*or rocket's, or torpedo's…*) perspective. A "Bomb's Eye" view of war.

TAXI CAMERA VIEW

The Taxi Camera View follows the player's plane as it taxis down the runway, just before takeoff. Zoom is available in this view.

CRASH CAMERA VIEW

When the Crash Camera View is toggled on, the camera automatically jumps to an external shot of the player's plane as it crashes.

BOMB BAY DOOR VIEW

Two examples of the Bomb Bay Door View, where the view is looking down at (*or out, if the doors are open*) the Bomb Bay doors.

GUN STATION VIEWS

In a bomber with multiple gun stations, each station has its own vantage point on the plane. To jump between the different gun stations, use the appropriate Hotkeys.

For a complete list of Hotkeys and Keyboard Commands, please review the **Janes Attack Squadron Keyboard Reference.doc** and the **Janes Attack Squadron Keyboard Command System.doc**, located on the *Jane's Attack Squadron* CD.

INFORMATION DISPLAY

When piloting an aircraft in *Jane's Attack Squadron*, there are several ways that pertinent information will be displayed.

MISSION OBJECTIVES

By pressing the "**P**" button, you can toggle your Mission Objectives on/off.

Mission Objectives that have not been completed will appear in gray text:
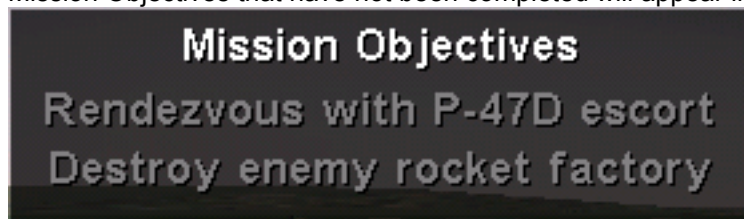
Mission Objectives that have been completed successfully will appear in green text:
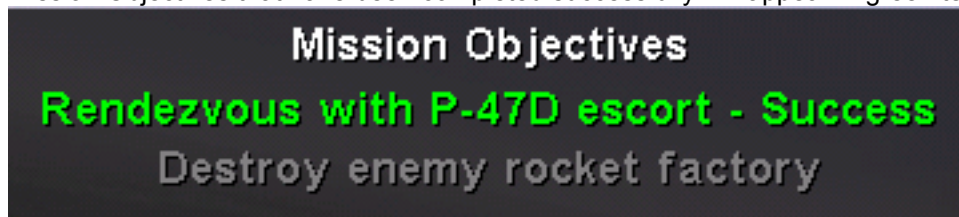
IMission Objectives that that player has failed to achieve will be displayed in red text:
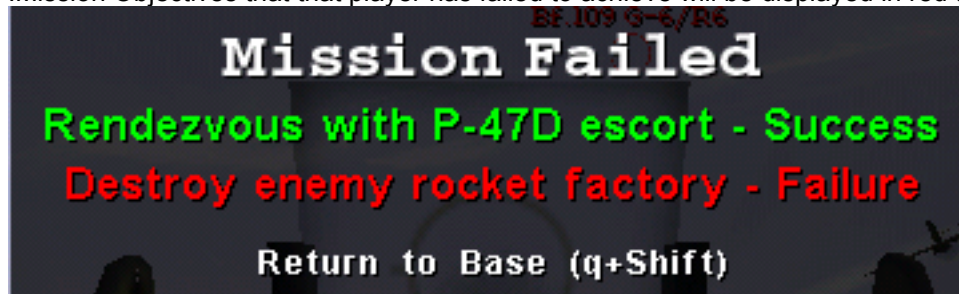
PLAYER'S FLIGHT INFO

In the lower left-hand corner of your screen, you will see the player's Flight Info:

Line 1: Player's speed (*205 miles per hour*)
Line 2: Player's height above sea level (*6052 feet above sea level*)
Line 3: Player's height above ground level (*4810 feet above ground level*)
Line 4: Player's compass heading (*96 degrees off North*)
Line 5: Amount of "G's" the player's pilot/plane are experiencing (*see below for more information on G-Force*)

Note that in the above screenshot, the text is green. When the player's Flight Info is in green text, this indicates that the player's engine is performing satisfactorily. If you are about to stall, the text will change to yellow. Once the engine actually stalls, the text will change to red. When toggled on, the player's Flight Info can always be found in the lower-left corner of the screen.

For more information on stalls (*and – more importantly - how to get out of them!*), see Basics of Flight: Basic Flight Maneuvers, below.

OTHER OBJECT INFO

"FRIENDLIES"

While the player's Flight Info will always be found in the lower-left corner of the screen when it is toggled on, other object information will appear in the lower-right corner of the screen.

You can also view the Flight Info of your wingmen, as well as see stats for friendly ground objects within range. To select an object, use the appropriate Hokey, and the information be displayed. The information for "friendly" objects will always appear in green text. Only the information pertinent to the selected object will be displayed; a tank will obviously not have it's 'height above sea level' displayed. Below is the information for one of the player's wingmen:

Line 1: Wingman's speed (*203 miles per hour*)
Line 2: Wingman's height above sea level (*5560 feet above sea level*)
Line 3: Wingman's height above ground level (*4318 feet above ground level*)
Line 4: Wingman's state (*this display will change as the selected object's state changes – it will say 'Destroyed' when the wingman has been shot down*)
Line 5: Wingman's clock position in reference to the player (*to understand this description, think of the direction*

that you are flying as "12 o'clock." In this instance, the player's wingman is in front of, and slightly to the right of, the player, at "2 o'clock.")

Line 6: Wingman's distance from the player (*354 feet*)

When a friendly object is selected, a green Position Marker will also appear on the screen, indicating exactly which wingman (*or object*) that you have selected:
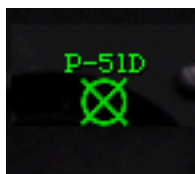
If the selected wingman was at the player's "6 o'clock," then this would appear at the bottom of the player's screen.

When a friendly object is within range and is selected, it will also appear in a Picture-In-Picture (*or PIP*) display in the upper-right corner of the screen. The PIP display can be zoomed, and (*along with all other on-screen information*) can be toggled either on or off using the appropriate Hotkeys.

For a complete list of Hotkeys and Keyboard Commands, please review the **Janes Attack Squadron Keyboard Reference.doc** and the **Janes Attack Squadron Keyboard Command System.doc**, located on the *Jane's Attack Squadron* CD.

ENEMIES

The player also has the ability to select – and target – enemy objects in much the same was as he selected "friendly" objects.

Like "friendly" information, enemy information appears in the lower-right corner of the screen, but is always displayed in red text:

A Position Marker for the enemy will also appear:
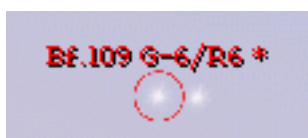
NOTE:
When a plane initially comes within visual detection range of the player, what we're actually seeing is the 'glint' of light reflecting off that plane's canopy.

The selected enemy object will also appear in the PIP display:

TARGETING INDICATORS

In Jane's Attack Squadron there are several visual devices that can be toggled on (in the Game Options Screen) to assist you in hitting your intended targets.

AIMING RETICLE
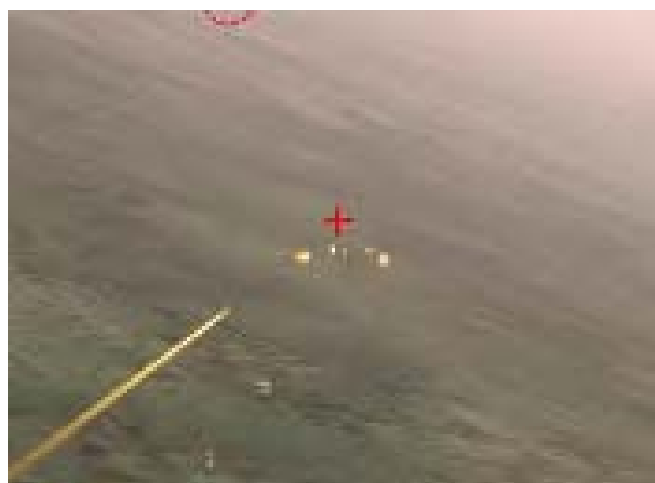
While piloting a fighter, the Aiming Reticle appears as a small red crosshairs in the center of the screen, and this indicates where your projectile weapons, such as guns and cannons, are currently aimed for.

Target Lead Indicator
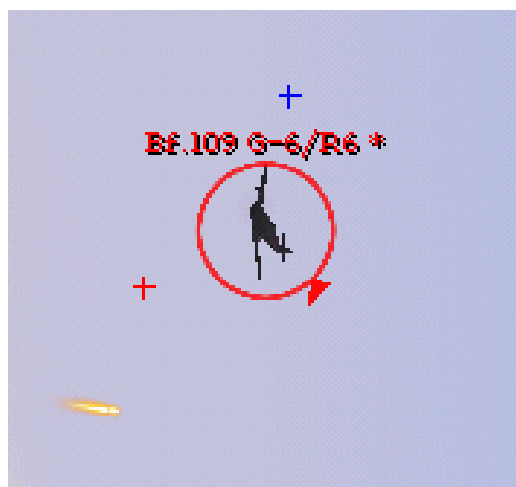
The Target Lead Indicator appears as a small blue crosshairs, and works in tandem with the Aiming Reticle. The Target Lead Indicator pinpoints the spot where you need to aim your projectiles in order to make a hit on your selected target. As you and your opponent are both moving – up and down, side to side, as well as varying your speeds – you need to 'lead your target,' so that the projectiles and the target will both be in the same place at the same time. It's hard to hit a moving target, but the Target Lead Indicator can help.

The same principles apply when attacking stationary targets, because you (*as the attacker*) are constantly changing your position in the world relative to a stationary target.

Line your Aiming Reticle up so that it falls right on top of the Lead Target Indicator, and you greatly increase your chances of making a hit.

The Target Lead Indicator can be toggled ON/OFF in the Game Options Screen.

Target Aspect Caret

The Target Aspect Caret gives an indication of the relative position of the selected target; the Target Aspect Caret points in the object's direction of motion. This information is useful in assessing where to aim so that you can successfully 'lead your target' and make a hit. The Target Aspect Caret is also helpful when trying to outmaneuver an enemy pilot.

The Target Aspect Caret can be toggled ON/OFF in the Game Options Screen.

BOMB IMPACT INDICATOR

The Bomb Impact Indicator is a small green crosshairs that appears when the player is in the bombardier's position, and it indicates where a bomb would hit the ground if they were released at any given moment. The Bomb Impact Indicator is particularly helpful when using the Fixed Bombsight.

The Bomb Impact Indicator can be toggled ON/OFF in the Game Options Screen.

WAYPOINT INFORMATION

Waypoint Information can also be toggled on/off with the use of Hotkeys. Waypoints are locations that could be used within *Jane's Attack Squadron* to describe a destination, target, etc., which the player must fly to within the course of his current mission.

Toggling the Waypoint Information once will bring up the following display at the top-center of the screen:
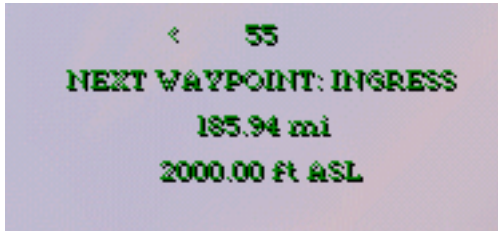
Line 1: The directional degrees that the player is 'off' from the Waypoint (*55*)
Line 2: Waypoint name ("*Ingress*")
Line 3: Distance to the Waypoint (*185.94 miles*)
Line 4: Waypoint's height above sea level (*2000 feet ASL*)

A second toggle will bring up a green Position Marker for the selected Waypoint :
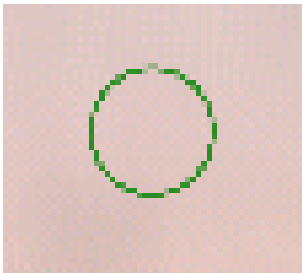
DAMAGE MESSAGES

When the player's plane sustains damage *(or damage is sustained by an enemy)*, Damage Messages are displayed at the bottom of the screen. Damage Messages can be toggled ON/OFF in the Game Options Screen.

Damage sustained by the player appears in red text, while damage inflicted by the player is displayed in green text.

Damage Messages will also indicate when the coolant, oil, hydraulic, or fuel tank is leaking. The message would appear as "<Tank name> leaking" when it's leaking, and then "<Tank Name> empty" when the tank becomes empty.

BASICS OF FLIGHT

To fly any of the planes in *Jane's Attack Squadron*, you must learn a few basics. Each plane has its own idiosyncrasies in weapons and flight characteristics, but they do share common features and controls. Use this section to familiarize yourself with the screens and basic controls for all planes in the game.

PHYSICS

Mother Nature did not intend for man to fly; yet man's curiosity overcame these rules. During flight, four physical forces are applied to an aircraft. The thrust of the engine and lift of the wings keep the plane aloft, while gravity and drag resist. In level flight, these four forces are in equilibrium. Lift and gravity equivalent, while the force of thrust exceeds the drag against the plane.

THRUST

Driven either by a rotary blade or a jet, a plane's engine provides the thrust to move the plane forward. During World War II, most planes were powered by rotary engines. These internal combustion engines drove the pistons that spun the blades of a propeller that, in turn, forced air backward and across the wings of the plane. This displacement of air from the front of the plane to the back forces the plane to move forward. The movement of air itself across the wings causes lift.

LIFT

Lift is caused by the flow of air across the top and bottom of a wing. In cross-section, the top edge of a wing is rounded, while the bottom is flat. The distance across the rounded top of the wing is greater than the distance across the bottom. To travel that distance in the same amount of time, the air must move faster. The slower moving air on the underside of the wing creates an upward force on the wing into the fast air that is racing across the top of the wing. This lifting force causes the plane to rise in the air.

More specifically, the direction of lift is perpendicular to the wings. So, if the plane is banking to the left, the lifting force of the wings points in a leftward direction. It is through the use of lift that a plane turns.

The amount of lift depends upon the plane's current **angle of attack**. The angle of attack is the difference between the direction of airflow and the angle of the wing to it. If you put a piece of paper in front of a fan, the paper resists the air as you expose more surface area to it—as you increase its angle of attack. Increasing the angle of attack increases the lift.

In planes, however, you cannot infinitely increase the angle of attack. Beyond thirty degrees, the angle of attack prevents air from flowing smoothly across the top of the wing, which is necessary to maintain flight. If a proper angle of attack is not restored, the plane **stalls** and begins to fall. To recover a stalled plane, you must regain airspeed and smooth airflow across the wing.

DRAG

Drag is the physical force that works in opposition to thrust. As the engines drive the plane forward, air molecules must pass across the skin of the plane. Some air molecules momentarily adhere to the side of a plane, reducing the power of the thrust. Thus, it's very important to have extremely smooth surfaces on a plane.

Lift can cause drag, too. Remember that the direction of the lift is perpendicular to the wings. If the plane is climbing, then the lift vector is pointing towards the rear of the plane. This rearward vector resists the thrust of the engines. Because a plane needs to be able to climb, its engines must meet more stringent requirements that level flight. There are other, rarer forms of drag.

GRAVITY

Gravity is acceleration placed on all objects towards the center of the Earth. In flight, gravity works in opposition to the lift of the wings. Flight is achieved by forcing enough air (thrust) across the wings to create enough lift to overcome the forces of gravity and drag.

G-force

G-force is a measurement of force on a body such as a plane or a pilot. This force is measured relative to the force of gravity. An aircraft flying level at low altitudes experiences 1G. Sudden changes in velocity or direction add G's that the plane and pilot must bear. Good examples are a takeoff, a tight turn in an aircraft at moderate to high speed or a loop maneuver.

G-forces can be either positive or negative. **Positive Gs** occur in sharp turns and steep climbs. They are the forces that push the body further into the seat during acceleration. **Negative Gs** work in the opposite direction; they make the body feel lighter and pull you out of your seat. A body experiences negative G's during steep dives. A body can withstand many more positive G forces than negative G forces.

Apparent Weight

Apparent weight indicates how heavy an object seems to be, given the direction and magnitude of G-forces that are acting on it. In level flight, 1G acts on the aircraft and the pilot; they weigh what they do when stationary. If the pilot makes a steep climb, the positive G-force acts on both the pilot and the aircraft, making them seemingly heavier throughout the climb. Any sudden increase or decrease in acceleration brings about a change in apparent weight of an object.

Physical Effects of G-Forces

Human bodies can withstand approximately 9 or 10 positive Gs or 2 to 3 three negative Gs for several seconds at a time. Exceeding positive G limits for longer than that causes blood to collect in the lower part of the body and torso. Vision turns gray, followed by tunnel vision and pilot blackout. Excessive negative Gs have a similar effect, except that blood pools in the brain and upper torso. This causes the small capillaries in the eyes to swell, creating a redout effect.

BASIC FLIGHT MANEUVERS

This section covers the basics of flight—takeoff, climbing, descending and landing—and outlines basic recovery procedures for stalls.

TAKEOFF

Taking off from an airfield is straightforward. Lower the flaps to increase the lift of the wing. Then, apply full throttle.

When you generate enough forward airspeed and lift, the tail of the plane rises off of the runway surface. Gently apply rear stick to pitch the nose up approximately 10 degrees. Don't climb too steeply; if your airspeed begins to fall, lower the nose of the plane to avoid stalling.

To take off:
1. Lower flaps.
2. Increase throttle to 100%.
a. Wait until your speed is over 100 mph (160 km/h). Gently pull back on flight stick to pitch the nose up five degrees. Keep pitch steady. If airspeed drops, lower the nose.

NOTE:
You can take off automatically by using the game's autopilot feature.

CLIMBING

After takeoff, retract the landing gear. It creates drag, which inhibits speed.

Keep your throttle on its full setting, and pitch the nose upward until it's at about twenty degrees. If you start to lose airspeed or if the STALL warning appears onscreen, dip the nose down until you're flying level. Then resume your climb at a gentler angle.

Maintain your climb until you reach the desired altitude. At the same time, you can gently turn towards your first waypoint.

To level out, reduce the throttle until you slow to the flight's cruising speed. Make slight adjustments to the throttle until you're flying at a constant speed and altitude.

To climb:
1. Retract landing gear while maintaining full throttle.
2. Pitch upward at a 20-degree angle.
3. At the desired altitude, level out and reduce throttle to your desired airspeed.
4. Make slight throttle adjustments until you have a constant speed and altitude.

DESCENDING/DIVING

To reduce altitude, you can descend or dive. To descend, reduce your throttle, which reduces lift and therefore drops your altitude. Use this method for gentle adjustments.

Alternately, you can pitch the nose downward to dive in a hurry. The dive is often used to attack a lower-flying aircraft or to recover from a stall. Long or steep dives can freeze the aircraft's control surfaces.

➢ **Gentle Method**: Decrease throttle to slowly lose altitude at the current airspeed.
➢ **Drastic Method**: Pitch down to descend quickly and gain airspeed.

BANKED TURNS

A banked turn can rapidly change your direction. By pulling back and either left or right on the stick, you make a banked turn. To accelerate the turn, apply rudder in the direction of the turn.

Be sure to add throttle before entering the turn to maintain airspeed and altitude.

To make a banked turn:
1. Add throttle as needed before entering the turn.
2. Push stick left or right to roll the airplane onto a bank.
3. Pull back on the stick to begin the turn.
4. Push stick in the other direction to level the plane out of the turn.

LANDING

A number of factors decide whether you land an aircraft or turn it into scrap metal. Landing requires smooth adjustments to throttle and pitch. Begin your approach at least three miles (*4.8km*) from the airfield at about 1000 ft (*304m*) of altitude with throttle at 3/4 speed. Drop your landing gear and lower the flaps. Lowered flaps increase the lift of the wing and allow you to maintain flight at lower speeds. Pitch down to begin your descent, yet maintain airspeed of no more than 120 mph (*193 km/h*).

When the aircraft reaches the edge of the runway, you should be 20 to 30 feet (6 to 9 meters) above the tarmac. Firmly pull the stick back to raise the nose above the horizon. Chop the throttle to zero. The front wheels will touch down. As your skills progress, you may touch down all three tires simultaneously—a three-point landing.

To land:
1. Line up to land from 3 miles (*4.8km*) out, at 1000 ft (*306m*) altitude.
2. Reduce speed until you're below 120 mph (*193 km/h*).
3. Lower the landing flaps and landing gear.
4. Gently pitch the nose down.
5. Reduce airspeed and altitude until you are 20 to 30 feet (*6 to 9 meters*) above the ground.
6. At the edge of the runway, pitch the nose up fifteen degrees.
7. Cut the throttle to zero and coast in.

STALLS

A stall is the loss of lift. When your aircraft's speed drops below a minimum required to maintain lift for your current angle of attack, you fall into a stall. Without lift, your aircraft falls toward the ground and your control surfaces are useless, much like a sail without a breeze to fill it. Stalls occur during tight turns, steep climbs, loops, takeoffs, and landings.

To exit a stall, let the aircraft fall to gain speed. Try to keep the nose oriented toward the ground. Throttle up to 100%. Eventually, your plane gathers enough airspeed to restore airflow over the control surfaces to return control of your aircraft.

To exit a stall:
1. Restore stick to center position.
2. Let the aircraft fall to regain airspeed.
3. Increase throttle to 100%.
4. When the controls respond, level the plane out.

SPINS

A spin is a type of stall that occurs when one wing loses lift. A spin often happens when you make a hard turn and have the nose pitched too steeply. Lift fails on one wing, and it begins to drop toward the ground. Meanwhile, the opposing wing keeps producing lift and rising. If the rudder is engaged, it rotates the aircraft about its yaw axis. The result is a spinning corkscrew motion.

To recover from a spin, you have to stop the aircraft's rotating motion. Center the stick and apply rudder in the opposite direction of the spin. Then, nose the plane downward. Hopefully, you have enough altitude to recover.

To exit a spin:
1. Restore stick to center position.
2. Pull the throttle back to 10%
3. Apply rudder in the direction opposite to the spin.
4. Pitch down.
5. When you stop spinning, level out and increase throttle.

NOTE:

You need about 3000 ft to recover from a spin. If you do not have enough altitude, BAIL OUT!

WEP

WEP stands for War Emergency Power. During WWII, many planes were capable of having a quick 'turbo-boost' from WEP, thus allowing the plane to generate more than its rated 'maximum power' for short periods of time. WEP was particularly useful in combat situations, as its use could provide both added speed and a better climbing ratio.

The various planes, and the various countries that produced them, all used slightly different technologies when implementing WEP. Two of the most common WEP technologies were the use of water-injection to the engine, or the use of a water/methanol 'cocktail. '   The effectiveness of WEP varies from aircraft to aircraft and altitude. Each aircraft has a limited supply of WEP, and extended use of WEP would cause the engine to overheat and even stall.

In *Jane's Attack Squadron*, the following planes are capable of employing WEP:

P38J
P47D
P51D
B17
B24
Spitfire MKI
Spitfire MK9
Bf109E
Bf109G
JU88A4
JU88G7

AIR-TO-AIR COMBAT

Even before the start of the World War II, fighter tactics had led to a realization that remains true to this day: the outcome of air-to-air conflicts is largely determined by who can maintain air superiority in quality of pilot, technology, and sheer numbers. Whoever controlled the skies has a distinct advantage. If you can maintain control over critical battlefield areas, then you can perform strategic bombing, support frontline forces, conduct reconnaissance, and inhibit enemy advances.

During World War II, air combat became a primary weapon in the European battle. In the crucible of combat, fighting techniques and technologies rapidly evolved. As generations of combat planes built in the 1930s and 1940s improved on the previous ones, pilots developed dogfighting techniques from their wartime experiences. Many of the strategies first discovered in World War II remain viable today.

While pilots train and plan for a few moments of combat, those moments, when they arrive, often rely on basic instinct. To succeed as a pilot, you need to know the basics and then refine your skills and inherent talents.

COMBAT BASICS

Combat is often won or lost before the first turn, and making the first detection is the key. If you see the enemy first, chances are good that you can win—provided your position is not disadvantageous.

At the point of detection, you must make some quick assessments of the enemy. What is his position? What is his energy state? Who has the advantage? What kind of aircraft does he fly? What are his weapons systems? What are his numbers? All of these questions must be answered quickly and compared to your situation. Then, you can assess how to engage. Sometimes, the best course of action is to flee; if you can't win, you can at least live to fight another day.

Combat has several distinct phases. These phases do not necessary occur linearly. In fact, combat is most often an ever-changing mix of the five:
1. Detecting an enemy
2. Positioning for an attack
3. Maneuvering during combat
4. Firing weapons
5. Defending during an attack

Oswald Boelcke, an outstanding WW I fighter pilot and perhaps the best unit leader of the war, summarized the fundamental tactical rules for dogfighting into eight commandments. Known as Boelcke's Dicta, they are rephrased here:

➢ Take any advantages you can before you attack. Gain altitude and keep the sun behind you to blind your target.

➢ After you commit to an attack, finish it.

➢ Stick to close-range shots, and don't fire until you have the enemy lined up in your sights.

➢ Know where your opponent is. Do not look away and let him fool you with his maneuvers.

➢ Make your attack from behind, if you can.

➢ If an enemy is making a diving attack on you, don't evade it. Instead, try climbing to meet him.

➢ When flying over enemy territory, be aware of your escape route toward friendly lines.

➢ Attack in numbers. If all pilots separate into individual battles, communicate and make sure no one is making a duplicate attack.

DETECTING THE ENEMY

Find the enemy first. Good search habits may give you the advantage of seeing without being seen, and it's important to keep that advantage for as long as possible. When flying in formation, keep your wingman close, as it's easier for two to cover the skies.

Vision

During World War II, a pilot's best weapons were his eyes. Radar did become available toward the latter stages of the War, but few pilots had access to it. Even at the end of the War, the key to winning a battle was still the radar in a pilot's head.

Aiming systems, too, relied on good eyesight. Tracking planes and aiming your weapons are challenging tasks when you're moving at 200 knots in opposite directions. Good eyes can give you the element of surprise and help you to finish the task.

Alter your Viewpoint

Some cockpits have obscured views. Particularly in the rear hemisphere, cockpits can have support beams or pieces of the airframe that prevent the pilot from having a clear view.

For greatest visibility, change your flight path from time to time to expose areas of the sky that are hidden behind parts of the plane. Weave left and right, as you check over your shoulders. Invert the plane to check below it. Use these tactics when flying alone or with a wingman to keep your flight group apprised of the environment.

POSITIONING

When planning an attack, first assess your positioning and attempt to improve it. The most successful attacks happen from the rear when the enemy is caught off-guard.

SURPRISE, SURPRISE

Surprise is supreme. You have a better chance of achieving good firing position if you surprise the enemy.

ATTACK FROM THE REAR

If you are behind your target, advantage is yours. The pilot in front must try to evade while maintaining eye contact with your plane—a real pain in the neck. While he struggles to evade, you are likely to find a good firing solution by keeping him in front of you and your guns.

APPROACH HIGH

When you attack from a high angle above your enemy, you can turn your altitude into energy as you dive. In close-quarters combat, the pilot with greater speed usually has the advantage. Press the attack or break off, if the advantage is lost.

USE THE SUN

Whenever possible, hide in the sun. Draw an imaginary line between your target and the sun, and position your plane somewhere along that line. Without electronic detection, planes can put a bright day to fine use. When you achieve position in the sun, drive right at your target.

USE THE CLOUDS

Clouds can also provide good cover. A fast dive through the clouds puts the advantage in your flight stick. Of course, if your enemy can't see through the clouds, then neither can you.

COMBAT MANEUVERS

COMBAT GEOMETRY

To compete in combat environments, you must learn geometric concepts and bury them into your instincts. These concepts describe relationships between your and your enemy's plane.

Target Aspect Angle

The target aspect angle measures the angular distance between your plane's flight path and the path of your target. When aiming, you want to minimize this angle. In other words, put him right on your nose. As your opponent increases the target aspect angle, you must lead him more with your gun in order to score a hit.

Relative airspeeds affect how quickly you and your opponent can change the target aspect angle. At higher airspeeds, turns are looser, making it more difficult to change the target aspect angle.

Cone of Vulnerability

Inside the range of an enemy's weapons, you're within the cone of vulnerability. Closer than 1500 ft (455m) and at less than a 45-degree target aspect angle, you are in danger. As he moves closer, the cone of vulnerability narrows. At an angle of less than 30 degrees, you can be shot down. Use evasive maneuvers to escape.

Closure Rate/Speed

Closure rate indicates your speed relative to the speed of your target. A positive closure rate indicates that the target is approaching; a negative closure means it is moving away. Closure can impact the performance of your weapons. Positive closures are good, as the opponent has less time to react to projectiles that are closing at very high relative speeds.

PURSUIT TACTICS

In close-range fighting, strive to gain a better firing position on your opponent. To maintain or improve your position, use any or all of these three techniques of pursuit.

Lead Pursuit

In a lead pursuit, you aim for a point just in front of the nose of your opponent. You are attempting to predict where the opponent is head, which is no small feat. If your plane has a tighter turn radius than your opponent, you can use this technique to your advantage to close your target aspect angle and increase your closure rate. Beware that the enemy can visually fall beneath the nose of your plane as you try to lead him. In such cases, he may make a sudden move and disappear completely.

Lag Pursuit

Instead of aiming for a point in front of the opponent, you aim for a point behind the opponent in a lag pursuit. By making looser turns than your opponent, you retain more energy. To lag pursue, keep the opponent visible in the upper-half of your windscreen.

Pure Pursuit

In a pure pursuit, you drive your plane directly at the tail of your opponent. In close quarters, when you're nearing a firing solution, a pure pursuit may finish the encounter.

Exchanging Energy

In a combat situation, an aircraft possesses kinetic energy (speed) and potential energy (altitude). Through maneuvers, you exchange kinetic energy for potential energy, and vice-versa. You dive to gain speed and climb to gain altitude. Finding the balance between speed and altitude requires experience and timing.

NOTE:

An aircraft with energy has maneuvering options. One without energy does not. Regaining energy is not easy, especially in a combat situation.

Ration your consumption of energy, both potential and kinetic. Do not engage in unnecessary maneuvers.

TAKING THE SHOT

When you've moved into a shooting position, you need to consider several factors before you unleash a hail of bullets. What's your flight path and airspeed? What's your opponent's? Are you closing or separating? While the bullet is in the air, it is subjected to physical forces like drag and gravity. Let it be said that scoring a hit and bringing down an enemy isn't easy.

Target Speed

When aiming for a shot, consider your opponent's speed. Unfortunately, WWII-era planes had no assisting technology; trust your eyes. A target's speed must be factored into where you aim your gun.

Target Aspect Angle

When aiming, you want to minimize this angle. In other words, put him right on your nose. Relative airspeeds affect how quickly you and your opponent can change the target aspect angle. At higher airspeeds, turns are looser, making it more difficult to change the target aspect angle.

Gravity Kills

Gravity affects your bullets, too. While your gun attempts to fire in a straight line, the true arc of your bullets is curved. Whenever firing at ranges beyond point-blank, take gravity into account.

Gunsight

During World War II, pilots used telescopic sights to aim their guns. Reflector sights mounted in the cockpit held a projected circle in the center of which was the sight. As the War progressed, this "pipper" adjusted to the size of various aircraft to improve targeting. By the end of the War, lead-computing sights had arrived and significantly improved gun performance.

Deflection Shots

One common technique is deflection shooting in which you lead your target into the stream of bullets coming from your gun. The **deflection angle** refers to the angular distance between the center of your gun's boresight and your aim location. By closing this angular distance while firing, you can lead your opponent into your bullet stream.

Snapshots

A snapshot delivers a burst of bullets on a half-second pull of the trigger. Snapshots should be reserved for close quarters combat when you have little time to aim and are less likely to miss. Timing is critical.

Tracking Shots

If you can get into position to shoot without revealing yourself to the enemy, a tracking shot may enable a quick kill. Center the target in your sight to verify your aim. The shooting opportunities are rare; do not attempt tracking shots in skies filled with bandits or rear-firing bombers.

Sure Shots

The best shots come from the opponent's rear quarter at close range. However, getting such shots is a challenge. Whatever the situation, have patience. Wait until you are in weapons range and in good position. You only have a fixed amount of bullets to complete your mission.

CHOOSING YOUR ATTACK

When you move in for the attack, you can choose to engage the enemy in a turn fight or an energy fight, depending on your skill and your plane's capabilities.

Most dogfights last a few seconds. Whoever gains the initial advantage usually wins. Every fight is different. An aircraft designed for turn fighting may find itself better positioned for an energy flight.

How do you decide which to use? See your opponent, and assess his turning abilities versus yours. If he can outmaneuver your best turn, you'd better try to beat him in an energy fight. If so, make use of your power, and beat him with speed.

The Energy Fight

In an energy fight, you have the advantage of kinetic or potential energy or both. If you can start in a good position with an energy advantage, you can finish off your opponent quickly.
To win an energy fight, you concede maneuverability in order to close very quickly. Keep your airspeed high as you cut the distance between you and your opponent through a series of head-on attacks. Strike, outrun your opponent's weapons, and then turn and strike again. Thanks to your surplus speed and a good turn, you can enter and exit the fight at your leisure. The key is to minimize the loss of energy in your turns.

The Turning Fight

If you've got a highly maneuverability plane, you may be able to win the day in a turn fight. Reduce the distance between you and your enemy by making a series of very tight turns. In a turn fight, you attempt to minimize your opponent's maneuverability by making hard turns after you pass head-on. If you can jump on his six in a single turn, you've gained a large advantage. Turn fights come in two variations: one-circle and two circle.

Two-Circle Fights

As you pass each other, you both loop around behind each other. He who turns tighter gains the advantage. Two-circle fights keep the opponent in view most times yet tend to increase the distance between the aircrafts. Seek to close this distance.

One-Circle Fights

When you and your opponent choose to circle in the same direction, you've begun a one-circle fight. A one-circle fight works only if you have a significant turning advantage over your opponent. In fighters with poor rearward visibility, a one-circle fight can be very dangerous.

The Initial Turn

When making the initial turn, timing is essential. Turn too soon, and you pull across the bandit's nose. Instantly, you're exposed to his guns and put on the defensive. Turn too late, and you're out of position. It takes timing and practice to master the initial turn.

DEFENSIVE MEASURES AGAINST GUNS

In close-in combat, your task as a defender is to shake off your attacker before he can achieve firing position through these series of maneuvers. As soon as you ward off an attack, attempt to gain the advantage over your opponent.

Extending

When you make a full-throttle run away from your enemy, you increase distance and the likelihood that any shot from him is a missed one. Extending, however, is only effective if you are confident that your aircraft is faster than his. Don't turn; drive fast and hard in a straight line away from him.

Defensive Break

With an attacker on your six, execute a sharp turn to force him to catch up. If your attacker is approaching from another angle, turn towards your attacker; he has less time to shoot at your plane. Additionally, he is more likely to lose track of your tail.
To conduct a break, apply firm left or right stick as you go into a roll. Pull the stick back to pitch the nose into the turn.

Thach Weave

Invented by WWII veteran Jimmy Thach, the Thach Weave allows two friendlies to reverse the table against a lone bandit. When the bandit is closing, the friendlies break away from each other. When the bandit breaks after one friendly, the other breaks towards them. The tailed friendly turns to lead the bandit across the gunsight of his wingman.

Chandelle

A sweeping 180-degree turn, the Chandelle is fine for preparing to attack yet is unsuitable for close quarters combat. Throttle up, pull back on the stick and begin a gentle roll, as you slowly climb and turn. Be careful with the pitch, as too much can cause you to stall.

Wing Over

A dangerous maneuver, the Wing Over can be used to reverse direction. Throttle and climb steeply. When the plane begins to stall, use the rudder to pitch the nose of the plane over so that it points downward. When the plane begins to fall, you can accelerate downward to regain control and return to your pre-maneuver altitude. While it's dangerous if you can't regain control of your plane, it is an effective means of making multiple attacks on slow-moving ground targets.

Immelmann

Popularized by German pilots, the Immelmann provides a quick change of direction while gaining altitude. Throttle up and pull back hard on the stick. As the nose climbs through vertical, roll the stick left or right to return to level flight. Be sure to have plenty of airspeed.

An Immelmann can be combined with a slight change of heading at the top or a pitch forward to further confuse your pursuer.

Split-S

The Split-S trades altitude for energy and reverses your direction. The mirror opposite of the Immelmann, the Split-S involves a snap half-roll to invert your plane. Then, pull back hard on the stick to level the plane out as you dive through the air. Apply the Split-S when engaging a lower enemy, evading an attack, or ducking out of battle altogether. Watch the altitude, and be sure that your opponent doesn't have a superior diving aircraft.

Skid

Like a car, you can skid a plane. To skid your plane, push the stick left or right to drop one wing, and turn the rudder in the opposite direction to the push. You bleed energy and altitude, but your opponent may mistake it for a turn. If he bites, you may be able to quickly gain the advantage.

Jinking

By quickly alternating turns, you force your opponent to match each motion of your stick. A jink is effective against a faster-moving opponent who may not be able to turn with you.

Be Unpredictable

If none of the above maneuvers shakes your opponent, do whatever is necessary to increase the angle of deflection to degrade the quality of his shot. When you make predictable moves, your opponent can anticipate them and compensate for your efforts. So, it's to your advantage to be as unpredictable as possible. Get creative. Combine maneuvers to invent your own style. The goal, however, is to escape; points for style are not awarded to the defeated or the dead. Whatever you do, do it with sufficient altitude and space between you and other opponents.

An American pilot by the name "Killer" Caldwell took Hartman's concept one step further, adding rudder to kick his aircraft to one side and throttle to speed up the uninverted loop. This last move coined the phrase "stuffing it all into the corner."

KNOWING YOUR GUNS

Depending on the aircraft that you fly, you must learn the nuances of your particular gun. Guns either fire traditional bullets or cannon rounds that explode on impact. While a single cannon round can drop a plane, the weapons have a slower rate of fire. In general, larger caliber projectiles move slower, yet if they find a target, they tend to do more damage. During World War II, American planes tended toward the smaller-caliber, faster weapons. The Germans favored the opposite.

Nose-mounted guns had to be synchronized with the spin of the propeller blades, which opened gaps in the bullet stream through which an enemy could escape. Few planes went down with a single shot, as few external systems or components were vulnerable. Planes often came back with airframes peppered with holes.

Some planes mounted guns under the wing or, in the case of larger bombers, elsewhere on the fuselage. Wing-mounted guns fired at a pre-determined spot in front of the plane. Rear- and belly-mounted guns often pivoted and required a fulltime operator.

Until the middle of the War, guns were of limited success. Without automated assistance, hitting a moving plane was, and is, a terrific challenge. Recoil from mounted weapons caused inaccuracy and could throw the plane off its flight path. Toward the end of the War, lead-computing gunsights displayed a targeting pipper on a glass pane in front of the pilot. Thus was born the first HUD.

MULTI-STATION BOMBERS

The larger, slower-moving bombers of WWII made for an easy target for the more nimble fighters. As a way to counter this weakness, both Allied and Axis bombers were equipped with multiple Gunning Stations at various points along the fuselage. Positions included Belly Gun (*or Ball Turret*), Nose Gun, Tail Gun, etc.

In *Jane's Attack Squadron*, if you are flying aboard a bomber (*either in Single Player of Muliplayer Mode*), you can jump between the various available Gun Stations by using the appropriate Hotkeys. A Gun Station is available if it is not already occupied by another player.

For a complete list of Hotkeys and Keyboard Commands, please review the **Janes Attack Squadron Keyboard Reference.doc** and the **Janes Attack Squadron Keyboard Command System.doc**, located on the *Jane's Attack Squadron* CD.

AXIS GUNS

MG 131 Gun

The standard gun on German aircraft during the War, the Rheinmetall MG 131 12.7mm machine gun was a lightweight weapon whose firing mechanism was electrically powered and later was incorporated into larger aircraft guns. Relatively slow compared to the American guns, the MG 131 could maintain a firing rate of 15 rounds per second.

MK 108 Cannon

A 30mm cannon, the Mk 108 was a popular model when working. In close quarters, it was known to split a plane in half. However, a lack of testing could not fix jamming problems. Lightweight weapons, multiple Mk 108s could be mounted on a single plane. Fire rate was 10 rounds per second.

MG 151/20 Cannon

Perhaps the most important and effective German gun in the War, the MG 151/20 delivered heavy 20mm rounds at a high rate of speed. Although firing at a lower rate than the Mk 108, the cannon shot rounds at a high rate of speed and provide an effective threat against fighters and bombers.

ALLIED GUNS

Hispano 20mm Cannon

Developed under license during World War II, the Hispano cannon delivered 20mm rounds with dangerous impact. Except for the firing mechanism, the gun is considered an excellent example of engineering at the time. The fastest rates of the dependable Hispano reached just over 10 rounds per second.

.30 cal Machine Gun

During WWII, the Colt Browning .30 cal machine gun was the most popular model among the Allied forces. Used during WWI, this gun saw significant action in the early stages of the Second World War. Later, tracer rounds were added to the metal-linked ammo belts. As the .50 cal version became available, this gun was moved into rear- and side-mountings on bombers.

.50 cal Machine Gun

Easy to manufacture and reliable in operation, the .50 cal Colt-Browning became the standard forward-mounted gun on US planes. Typically mounted under the wing, the .50 cal delivered heavy bullets at extremely long ranges. Its muzzle velocity of 2910 ft/s (887 m/s) rivaled the German MG 131 machine gun.

BOMBER ESCORT/INTERCEPTION TACTICS

World War II saw the advent of heavy, long-range bombing into the strategies of war. As missions carried far over both sides of the front, military theory had to adjust to protect bombing flights. Escort and its opposite, interception, became staples of the war machine for both sides. Despite more guns added to lumbering bombers, they were still easy targets in the air and needed to be defended.

ESCORT MISSIONS

In order to put the offensive-minded bombers into position over the target, planners needed to provide these slow planes with extra defense. At the start of the War, bombers flew in staggered formations to allow their side gunners to protect each other; it didn't work. Over time, planners realized that bombers needed dedicate support flights to protect them. American bombers could be escorted to or near to the target area. Range was a problem for these smaller escorts, and the invention of drop tanks somewhat alleviated the issue.

As the War progressed, Allied planes grew in number, while the Luftwaffe ranks began to thin. Ratios of escort-to-bomber dropped on missions from 6-1 at the beginning of the War to nearly 2-1 at the end. Some escort planes were given the freedom to roam within 100 miles of the flight path to engage any encountered enemies. Over time, the Allied bombing effort improved results and wore down the German defenses.

INTERCEPTION MISSIONS

When intercepting bombers, traditional dogfighting did not apply. A bomber could never outmaneuver a fighter, so these big, slow planes were loaded with anti-aircraft guns. On both sides, strategists analyzed the defenses of each bomber type to probe for a weakness. As escorted missions became the norm, additional strategies were developed. Escorts would often fly ahead of the bombers and engage any squadrons to divide them before they approached the bombers. The Germans, however, countered this tactic by directly engaging these escorts to force them to drop their external tanks. With reduced fuel capacity, the escorts were forced to return to base, thus exposing the bombers to the German interceptors.

BOMBER ATTACK COUNTERMEASURES

Naturally, the Allies developed countermeasures. By staging multiple escort flights with each bomber flight, the first flight scouted ahead to engage the initial wave of German resistance. The Germans, in turn, sought to counter this tactic by bullrushing past the first wave to reach the bombers.

By approaching in varied formations, the Germans confused American gunners. Sometimes, the Germans attacked from front and sometimes from the back. As American outfitters moved guns from front to rear, from top to bottom, and from left to right on their planes, the Germans tried to confuse them with approaches from unexpected angles. At the height of the War, bomber flights held very tight formation with each bomber carrying up to eight guns. The war within the war continued until the end.

ATTACKING BOMBERS IN THE GAME

Although bombers present large and slow targets, many are equipped with multiple, manned guns and escort aircraft in the area. To stop a bomber, you must overcome these defenses.
In general, attack a bomber from above or below and to one side to avoid unnecessary gunner fire. If you have a defined target, study its weapons systems in advance.

High/Low Side Attack

A high-low attack seeks to avoid too much exposure to a tailgunner while giving you a wide cross-section of the top and bottom of the plane to pepper with bullets. To start, position yourself 1500ft (455m) above the intended target. Nose down and dive on the target, unleashing bullets. When you dive past the aircraft, level off 1500 feet below it. Reverse the attack on the opposite quadrant of the plane. If you lack sufficient space to complete a dive, you can perform use the low option by itself.

Opposite Attack

When you lack time to prepare a tracking shot, you can engage an enemy bomber with an opposite attack. Attack from high above or below your target. When your opponent is centered in your sights, let loose a volley of shots. Repeat from the opposite direction.

Overhead Pass

An overhead pass is a variation on the Split-S (*see above*) and Immelmann (*see above*) maneuvers. By combining either of these maneuvers with a quick gun volley and an evasive maneuver to avoid tailgunner fire, you can quickly attack a bomber that is passing above or below you in the opposite direction.

AIR-TO-GROUND COMBAT

The first documented bombing occurred in 1911 when an Italian pilot threw several solid objects onto Turkish troops. Soon, pilots were tossing rocks, grenades, and assorted other small explosives out of their open cockpits. Technology soon caught up to the novel idea. By the end of World War I, the Germans had developed the Zeppelin armada that could deliver large explosives from Continental Europe to Britain. These early strategic bombing initiatives lacked accuracy and raised the ethical questions of bombing in or near civilian areas.

In the years between the Wars, Axis and Allied researchers realized the wartime value of tactical and strategic bombing and began developing airplanes to serve as platforms for larger payloads. Early bombers were variants of bi-plane designs, but as engines improved, air forces moved to mono-wing designs that could carry heavier payloads.

Prior to the start of the War, bombers were used primarily to support forward troops. Small payloads from tactical bombers were dropped on enemy lines. However, the Battle of Britain changed military thinking. By 1940, the German bombers were able to reach and to devastate British cities. The Allied powers began developing countermeasures such as improved anti-aircraft guns and aircraft interception tactics.

Towards the latter stages of the War, as the Luftwaffe became outmanned and outgunned, the Allied forces pushed strategic bombing back at the Germans. Allied bombers ventured far into Germany to level the industrial areas of the Ruhr valley, which dealt a punishing blow to Germany's war-making efforts. However, these missions were extremely dangerous; only one in 10 bombers lasted an entire tour of duty. The invention of the external drop tank allowed smaller, more maneuverable fighters to escort the bombers to their targets. At the end of the War, the Germans had no effective answer to the large-scale strategic bombing from the Allies. Even if the Germans were capable of turning the tide of the War with Hitler's secret weapons, the Axis powers had no means of rebuilding their industrial base to finish the War against the Allies.

BOMBS/BOMBSIGHTS

The device used to accurately drop bombs from an aircraft is called a bombsight. The Norden –Sperry bombsight was one of the most important U.S. military secrets of WW II. A mechanical analog computer, the Norden-Sperry Bombsight would assist the bombardier in determining the exact moment bombs had to be dropped to accurately hit the target. When properly aimed, it could place a bomb inside a 100-foot circle from four miles high. The Norden-Sperry Bombsight was so advanced, and provided so much of an advantage, that crew members had to take an oath to protect it with their lives.

USING THE NORDEN BOMBSIGHT

1. Turn on Autopilot by pressing the **'A'** key.

2. Select the Bombardier Station by pressing the '**1**' key on the top row keys. *Make sure you have identified the target and that you are lined up correctly for your bomb run!*

3. The "Bombsight Active Indicator' will light up. **You are now controlling the aircraft.**

4. Press '**D**' to open the Bomb Bay Doors. The Bomb Bay Doors Open Indicator will light up.

5. Move the Joystick and/or Rudders to adjust the bombsight tracking motor left/right and up/down, lining up the crosshair on the selected target.

6. **You will need to keep the crosshairs on the target for a minimum of 20 seconds of level flight**. Make adjustments with the joystick and/or rudders to keep the crosshairs on the target.

7. *The Bomb Release Cue Indicator will light up when all requirements are met (target tracked for 20+ seconds).*

8. *Make sure you are tracking the correct target; the sight makes no distinctions.*

9. Drop your bombs by pressing Joystick Button 2. Upon seeing your bombs drop, the rest of the squadron will bomb with you.

10. The Bombs Away Indicator will light up to tell you that they have been dropped.

11. Close the Bomb Bay Doors by pressing the '**D**' key.

12. Switch to the Pilots station by pressing **F1.**

13. Take control of the aircraft by turning off the Autopilot, and make a hasty getaway!

The British Lancaster Mk1, on the other hand, relied on the less advanced Fixed Bombsight, which was not too far removed from a telescoped set of crosshairs.

USING THE FIXED BOMBSIGHT

1. Turn on Autopilot by pressing the **'A'** key.

2. Select the Bombardier Station by pressing the '**1**' key on the top row keys.

3. Select your Mission Target by pressing the **'L'** key.

4. Press '**D**' to open the Bomb Bay Doors.

5. When the Mission Target appears under the crosshairs of the Fixed Sight, release your bombs by pressing Joystick Button 2. Upon seeing your bombs drop, the rest of the squadron will bomb with you.

6. Close the Bomb Bay Doors by pressing the '**D**' key.

7. Switch to the Pilots station by pressing F1.

8. Take control of the aircraft by turning off the Autopilot, and make a hasty getaway!

NOTE:
There is also a 'cheat' in the Options/Game Settings that puts a crosshair on the ground where the bombs will hit if released at any time, called the Bomb Impact Indicator. See 'Targeting Indicators,' above.

ROCKETS

Rockets are large, unguided warheads intended for either ground or air targets. Early rocket research can be credited to the Soviet Union, which started developing rockets as far back as 1920. Rockets would remain subsonic (*slower than the speed of sound*) until midway through WWII and see extended use as an air-to-air and air-to-ground weapon. Not terribly expensive by military standards, they were highly effective and adopted by ground, naval and air forces alike throughout WW II.

By 1942, the 3-inch RP (rocket projectile) had been adapted to British aircraft and multiple rockets could be fired from rail launchers under the wings. The typical rocket in use had a 60-pound explosive charge warhead, while a smaller-pound version was used to "spear" U-boats.
US rockets copied British designs and came into use in 1943, when the USAAF adopted the M8 4.5-inch rockets for aircraft use. By mid-1944, the five-inch wide, 69-inch long rocket had become the American rocket of choice—with 50 pounds of explosive material in the head of the rocket, a single aircraft could launch a devastating attack. One of the most successful rockets of the war it came to be called the American HVAR (high-velocity aircraft rocket), a supersonic air-to-ground rocket unofficially coined "Holy Moses." The P-51D Mustang could carry only three HVAR rockets under each wing, and the P-38 and P-47 five rockets under each wing. Though they required difficult precision aiming, HVAR rockets were capable of penetrating heavy armor and were thus more effective against the formidable German panzers than gun rounds.

Germany's first air-to-air rocket was a derivative of the spin-stabilized 210 mm projectile used in ground artillery. A single rocket housed in a large tube launcher, it was used to attack heavy bombers at standoff range. However, the weight of the launcher and rocket downgraded the aircraft's performance. Germany began engineering a new rocket (*designated R4M*) specifically intended for multiple-launch attacks against bombers. (*Later, the R4M was applied in air-to-ground attacks as well, but none were fielded in large numbers*.) These were especially effective when all 24 rockets were launched at once, the effect being similar to that of a shotgun. Despite the fact that Germany had developed a very promising weapon in the R4M, the Luftwaffe's attempts to outfit the Me 262A with rockets came late in the war, so few ever saw combat.

In an air-to-air rocket attack, aim exactly as you would while firing a gun. For ground attacks with rockets, the principles of aiming are similar to those described for glide-bombing ground targets — make a 30° or less dive, orient the nose toward the target, release the weapon, and pull out of the dive. The closer you are, the more likely your aim is to be true. The best approach, if you're facing little or no flak fire, is to fly low and level, then make a gentle dive at a lower altitude when you're ready to launch rockets.

USING ROCKETS FOR GROUND ATTACKS

1. Drop to below 1,000 feet (*305 meters*).
2. Fly near the intended target.
3. Aim the nose toward the target and pitch down into a 30-degree or less dive.
4. Fly straight toward the target and release the rockets.
5. Pull out of dive.

TORPEDOES

A torpedo is a cigar-shaped, self-propelled underwater projectile launched from a submarine, aircraft, or ship and designed to detonate on contact with or in the vicinity of a target.

While flying for the Luftwaffe, one of the planes that the player will have at his disposal is the extremely versatile Ju-88. The Ju-88 is the only tactical bomber in *Jane's Attack Squadron*, and the only aircraft equipped with torpedoes. The only valid ground targets for torpedoes are ships.

If an AI flying a Ju-88 is ordered to attack a non-ship object, it will provide a negative response and will not conduct the attack. An AI-controlled Ju-88 will never attack a ship with its guns, even though it has several of them.

Torpedo Bombing a Naval Target

1. Approach the target flying level at 150', at 170 mph, from 2 mi away.
2. Release the torpedoes (*using **Joystick Button 2***) 3,000' from the target, and immediately pull away at a 60 degree angle.
3. Circle to 2 mi before attempting a strafing run (*if the target was not destroyed*).

Strafing

Strafing is nothing more than a volley of bullets aimed specifically at ground targets. Machine gun and cannon rounds have difficulty penetrating heavily armored vehicles; strafing should realistically be preserved for use against transport vehicles and light personnel carriers.

You can strafe while diving, or while flying level at a very low altitude. If you choose to go low, take the extremely low road—the less altitude you have, the less time you'll spend in some ground gunner's sights. Dive strafing attacks are best applied to long targets, while low strafing attacks work well against smaller targets that are equally wide and long. Of course, you'll want to use whichever best suits your current position and combat situation.

For more information, see: **Air-To-Ground Tactics: Dive Strafing Attack** and **Low Strafing Attack**, below.

Air-To-Ground Tactics

Surprise

In an attack fighter, try flying in low (*500ft above the ground or less*), under the enemy's radar. Ground-based radar systems can detect your aircraft at high altitudes, but not close to the ground. If you approach undetected from an unexpected direction, the air-defenses may be unprepared. It takes time for them to turn and engage, giving you an opportunity to deliver ordnance and escape.

Radar waves are like light; they cannot penetrate solid objects like hills and buildings. Try flying at low altitudes between hills or behind clusters of buildings to hide from energy radar. As an added measure, leave your radar in standby mode as you approach an enemy position. Use it only in short bursts to identify target coordinates — this reduces your chances of being detected by their RWR.

Dive Bombing

Dive-bombing is a successive attack that consists of four distinct phases: a level approach, the dive itself, the weapon release, and the escape. You should ensure that you've got at least 10,000 feet (3048 meters) of altitude. The diving portion of the attack will consume a good chunk of your altitude, and you'll need room to pull out of it.

Dive-bombing generally refers to all attacks between 70° (near vertical) and 90 ° (pure vertical). At smaller angles, it's usually called skip-bombing. A vertical dive usually results in the best aim because

you're flying straight down at the target. However, the bomb must be released earlier in order to pull out of the dive in time.

To Dive Bomb:
1. Approach. Once you've spotted your ground target, line up with its longest side. This gives you more room for error, and you may score multiple hits.

2. Dive. Drop the nose down by pushing forward on the stick. Ideally, you want your dive angle to be between 60 and 70 degrees below the horizon, and you want the target to be just in front of you when you start the dive. Chop the throttle completely. Keep diving down toward the target and align your nose with the edge of the target closest to you.

3. Release. Somewhere between 2000 and 1500 feet of altitude (610 to 457 meters), release the weapons. You should be aiming near the front edge of the target—the bomb will always travel further forward due to momentum, so this increases your chance of one or more hits.

4. Pull out. Immediately apply heavy back pressure on the stick to level out, and then fly full throttle away. The best escape route is a low one—the lower your altitude, the harder it is for enemy ground guns to get a good shot off at you.

DIVE STRAFING ATTACK

To make a strafing attack from a dive, start your attack at about 5,000 feet (1525 meters), well to one side of the target and aligned along its length. Pitch the stick down to commence the dive. Keep an eye on the gunsight, and once you have the target in sight, let loose the bullets and start pulling out of the dive. Your inertia will disperse the stream bullets along the length of the target.

To perform a Dive Strafing Attack:
1. Drop to 5,000 feet (*1525 meters*) of altitude.

2. Position yourself to one side of the target, aligned with its longest side.

3. Pitch the nose down.

4. When target is in your sights, fire.

5. Pull out of the dive.

LOW STRAFING ATTACK

For a low strafing attack, go in below 300 feet (*90 meters*) of altitude and again position yourself off to one side of the target. You should be slightly beyond your gun's maximum range before you start the strafing run. Set the throttle to full speed and start firing as soon as you fly within your gun's maximum range. To spray your bullets slightly to either side, turn the rudder left and right as you're firing.

To Perform a Low Strafing Attack:
1. Start the approach below 300 feet (*90 meters*) and beyond maximum gun range.

2. Throttle up to full speed.

3. Fire as you come into gun range.

4. Apply rudder to spray bullets from side to side.

AVOIDING GROUND FIRE

When approaching a heavily defended area, be aware of the range of the enemy's ground weapons. During WWII, ground-based weapon systems brought down many, many planes.

When possible, stay high and dive steeply toward the ground target. Brave souls can try to approach at very low (*300ft or less*) altitudes.

FLAK

FLAK artillery (*also referred to as Anti-Aircraft Artillery, or AAA*) fires at high-flying air targets. When an enemy aircraft approaches, banks of FLAK guns attempt to pepper the path with projectiles.

AA

Smaller caliber than AAA, these guns aim at targets flying below 1000 feet (*333m*). Using tracer rounds, AA gunners actively hunt low-flying aircraft and can make a dicey run against enemy ground targets.

THE COMM MENU

FIGHTER COMMUNICATIONS

Speech in *Jane's Attack Squadron* is played when certain conditions arise in the world. There are several conditions that cause speech samples to play:

> **Player Command:**
> This is when the player issues an order to one of the fighters in his squadron. The player hears his own voice as he issues the command.

> **Player State Declaration:**
> When the player is shot or subjected to intense G forces he will hear himself react to this. This provides a player with an audio cue to what is going on in his environment.

> **AI Command Response:**
> Once the player has issued an order to an AI under his control, the AI will respond either positively or negatively to it.

> **AI State Declaration:**
> Certain conditions in the game world affect the state of Fighter and Bomber AI's. When these conditions occur they will trigger speech samples.

As the Squadron Commander, you give orders to the other members of your flight group, including your wingman. All flyers attempt to stay in formation unless you give them orders to do otherwise. When a combat situation arises, you must react quickly and decisively with a plan to ensure success of the mission at a minimum cost to your flight group.

As a pilot, you must maintain close communication with your wingman; your life may depend on it. The more eyes you have scanning the skies, the better.

WINGMAN, FLIGHT, AND SQUADRON COMMS

During flight, you can issue commands to your wingman, your flight, or the entire squadron. Depending on whom you are addressing, the available set of orders varies.

> To access the Communications menu, press TAB.
> To issue a command, press the appropriate row number key for the group (*Wingman, Flight, or Squadron*) to which you want to send it. Then, press the appropriate row number key to issue the command.

In the Comm Menu, you can choose who you wish to send a message to. Flights that are inactive, destroyed, or headed for base are grayed out in the Comm Menu. Orders that are no longer available (*for whatever reason*) are also grayed out.

When you issue an order, the flight lead of the group receives the order and then passes it to the other planes in his group. The receiving pilot evaluates whether or not he can follow the order and responds accordingly.

AI's will remember their last order until you override it by issuing another one.

Negative Response

The receiving pilot is engaged and in a defensive posture. To break off to complete the order compromises the pilot and his flight group.

Positive Response

The receiving pilot is not engaged or is engaged in an advantageous position such that he can respond to the order without compromise his or his wingman's safety.

Commands

BREAK	Break formation, or Break and Attack.
ATTACK MY TARGET	Attack the target that you are engaging.
ATTACK FIGHTERS	Attack the approaching flight of fighters. Avoid the bombers.
ATTACK BOMBERS	Attack the approaching flight of bombers. Avoid the fighters.
ATTACK GROUND TARGETS	Attack the ground targets. Avoid the aircraft.
CLEAR MY SIX	Clear any bogeys from the rear quarter of my aircraft.
RELEASE DROP TANKS	Release your drop tanks to reduce weight for escape.
FORMATION	Return to formation.
STATUS	Report your status.

> ➢ **Ju-88:** As a fighter-bomber, the Ju-88 has a reduced set of orders. When commanding a Ju-88 squadron, you can order the planes to attack your target or attack ground targets. When the order is given, the flight group responds.

Formations

To your wingman, flight, and squadron, you can issue commands to regroup in the default formation for the mission or into a new one of your choosing. Any group of planes can only be assigned to a single Formation.

> ➢ To issue a Formation Command, press TAB to open the Comm Menu.
>
> ➢ Select Formation. Then, select the type of Formation in which to regroup.

You can tell your flight to regroup in any of the following Formations:

Regroup	Regroup in default formation.
Finger Four	Regroup in Finger Four formation.
Echelon Left	Regroup in Echelon Left formation.
Echelon Right	Regroup in Echelon Left formation.
Line Astern	Regroup in single file formation, nose-to-tail.
Line Abreast	Regroup as a single line across.

> ➢ **Echelon Left** places a wingman behind and to the left of the flight leader. The other flight leader and wingman are behind and to the left of these two.

> ➢ **Finger Four** is positioned roughly like the four fingertips of your extended right hand. The distance between planes (fingertips) is about 600ft.

BOMBER COMMUNICATIONS

When the player assumes the role of bomber squadron commander, he is leading the rest of the bombers in the squadron. The other bombers in the squadron will always attempt to stay in formation and follow the player. There are no orders the player can issue to the other bombers in his squadron. When the player is over the target he must manually drop the bombs and once he does the other bombers in the squadron will follow suit.

BACKGROUND

AIR WAR COMES OF AGE

In the First World War, air power emerged as a dramatic new dimension of combat. German dirigibles had bombed London, causing panic. Biplanes and triplanes soared, locked in dogfights over the trenches of France. The men flying the fragile airplanes cut a romantic figure as they rose into the sky. In an era full of fear at the regimentation and mass movement of man, they were a welcome throwback to the knights of old, charging into enemy lines either single-handedly or in small squadrons. Among even the bitterest opponents, there was an almost medieval code of chivalry. Aces such as Baron Manfred von Richthofen (*the legendary Red Baron*) and his successor Hermann Goering became worldwide celebrities.

While capturing the imagination, these initial air ventures had little effect on the course of the war. Soon after the conflict ended, however, hints of the future began to emerge. Stronger engines and better designs made new strategies possible. The planes became bigger and faster, and were able to carry heavier loads. The implications of these advances were set forth with chilling vision by Italian Guilio Douhet, in his 1921 book Command of the Air. He declared the era of ground war over; from now on war could be fought and won in the air. Douhet proposed huge flying bombers that could penetrate far behind lines of battle—bypassing the trench warfare that had slowly eaten the morale of First World War armies—and pulverize enemy cities. The resulting panic and destruction would demoralize one's opponent and bring any war to a speedy conclusion.

British and American designers read Douhet's theories closely. Both began designing large, long-range bombers with the intent, should war come, of taking combat deep inside enemy lines. Both met strong internal resistance to such a strategy: the thought of slaughtering huge numbers of civilians was repugnant to the leadership, especially the American government of Roosevelt. It would be an ironic twist that those most reluctant would be the ones most successful at wholesale urban destruction, culminating in the atomic annihilation of Hiroshima and Nagasaki.
Equally ironic was that those who would goad the Allies into such devastation never put much stock in Douhet's book. Germany's rebuilt air power concentrated on the bomber as battlefield support, and their planes were accordingly smaller and with much shorter range. In the initial sweep of war, this would be highly successful. When the time came for attempts at behind-the-lines civilian assault, those most eager to decimate populations would find their air power poorly equipped to help in the project.

AIR POWER AND THE SECOND WORLD WAR

As the Second World War progressed, the theories of Douhet and another early champion of air combat potential, American William "Billy" Mitchell, would be tested to their utmost. Some ideas proved accurate; others had results far different than those envisioned. Douhet's belief that urban bombing would demoralize a nation proved quite incorrect when Germany attempted to level British cities in the Battle of Britain. In fact, it united the British people and hardened their resolve to see the war through to its conclusion. Oddly enough, the British leadership failed to learn its own lesson and followed the exhortations of another air power devotee, Arthur "Bomber" Harris, perhaps the war's most zealous advocate of massive civilian bombing. He was convinced that the German people, unlike his own island's residents, would crumble and blame their leaders for disaster if subjected to horrific raids. While the economic and strategic results of the massive Allied bombing effort can be argued, the German civilians, like their British counterparts, simply dug in and endured.

If civil collapse was not achieved, Britain alone could not accomplish the other goals of large-scale bombing. It took the entry of the United States into the war for the two nations to combine efforts and strategies and impact the German military machine in a decisive manner. Britain favored nighttime raids; America confidently chose daylight. Together this round-the-clock bombing strategy aimed to pummel German industry into the ground, and force the Luftwaffe into a defensive position, thus depriving German forces on the front lines of air support.

A burden to bombing strategy was the distance which the planes had to travel. Though equipped with some gun turrets, the bombers were easy targets for fast-moving fighter planes which rose to meet the attack. For raids along the nearby fringes of enemy territory, friendly fighters could fly as escort to the larger planes and fly out to engage enemy fighters. As Allied raids aimed deeper and deeper into German territory, however, the fuel capacity of their fighters forced the tiny planes to turn back often well before the bombers were over their prime targets.

Left on their own, the bomber losses were staggering. Champions of heavy bombing such as Harris and American General Carl Spaatz found themselves hard-pressed to justify the losses against the questionable levels of damage inflicted to German military potential.

One result of the Allied bombing offensive that was an unqualified success was its effect on the Luftwaffe. At a time when the tides of battle were turning against Germany, an air force designed for offense and ground support in the field of battle was instead forced to stay on home turf and defend industry and urban sites against an ever-growing enemy swarm. The attrition rate for Allied flyers was horrifying, but the sheer manpower available to the Allies meant losses could be replaced. Germany's losses were crippling. Skilled pilots were replaced by men who, due to time constraints and scarcity of fuel, had little training. No matter what "miracle weapons" Hitler's weaponers might design, the skills of those flying them ensured the impact of those wonders would be minimal.

AIR WAR: 1943–44

All across the western front in 1943, air power was playing a critical role. The early mistake Hermann Goering, architect of German air power, made in emphasizing smaller bombers for troop support was now apparent as the four-engine long-range bombers of the Allies roared over Germany. At the war's start, it was the Luftwaffe inspiring terror while screaming over foreign skies. Now, over its own territory, Goering's air force fought a desperate battle with an enemy growing in strength and confidence.

In late 1942, the Allies escalated saturation bombing to round-the-clock bombing. The British would fly over German cities by night and do their best to utterly destroy them. By day, American bombers would attempt to pinpoint more strategic targets and cripple German industry. American faith in its bombing sights was misplaced, however: the height their planes had to fly to avoid anti-aircraft artillery often negated any accuracy those sights might provide. Bombs often fell miles from their target.

In summer 1943 the Allies bombed Hamburg for four consecutive nights, taking 40,000 lives and creating a huge firestorm. The citizens—those who survived—were stunned and numbed, but did not turn on their leaders. In August, American planes from Libyan bases reached Ploesti, Romania's huge oil facility. As they flew over the Balkans, wave after wave of Luftwaffe fighters rose and hammered them. A quarter of the men on the mission died. Slightly more than one-sixth of the planes survived or were able to be flown again. The facilities were soon repaired and operational.

For both sides, losses were terrible. The Luftwaffe was losing pilots at a speed too great to replace. By late 1943, most planes rising to meet the huge fleets of Allied bombers with their swarms of fighter support were piloted by men with much less training, let alone battle experience. As for the Allies, their fighter planes could not make the longer journeys to support the bombers. As better fighters were built and their range increased, more German targets could be reached, but at a certain point, they had to turn back—and then the Luftwaffe and its speedy planes could tear the bombers to pieces. It would not be until 1944 that additional gas tanks called 'drop tanks' would enable Allied fighters such as the P-51 Mustang to penetrate deep into Nazi territory and destroy the Luftwaffe.

Equally dreaded was the 88 mm antiaircraft gun. Closely concentrated, dug in near vital industrial areas and other targets sure to attract Allied air raids, Flak guns may have taken out more bombers than the Luftwaffe throughout the course of the war.

Amazingly, though fuel and pilots were scarce, fighter production continued to rise in Germany. Hitler's new minister of production, Albert Speer, had reorganized the economy and cut as best he could through the multiple layers of squabbling bureaucracies to actually increase all-around military production. This in the face of round-the-clock bombing raises questions as to the strategic, as opposed to propagandistic, value of the constant raids.

One definite result of round-the-clock bombing was that the Luftwaffe was being slowly bled dry. While not destroying German industry, the bombing strategy had pinned Goering's forces down on the home front. While more planes were being built, they couldn't keep pace with the losses sustained against the Allies. Hitler began putting more and more hope—and more and more resources—into a host of experimental weapons he believed would turn the tide again to his favor. Goering, desperate to regain favor, encouraged his Führer in those dreams. And in the East, the loss of air support to defense over Germany left the Wehrmacht open to the grinding, inexorable advance of the Red Army.

COUNTDOWN TO INVASION

Hitler too hoped for a decisive blow on the beaches. In the face of the crushing defeats being dealt the Wehrmacht in the East, he was still convinced he could triumph over his enemies. He moved many of his best divisions to France and the Low Countries to wait for the invaders and smash them on the beaches. From there, holding them in the Italian bottleneck would be easy. Full force could be concentrated on the Soviets, who would then crumble. Hitler could then choose the time and place for his victorious attack against the West.

Unfortunately for the Führer, his visions of destiny combined poorly with faulty Nazi intelligence gathering. Allied diversions led German High Command to grossly overestimate the size of the invasion force gathering in England. Thus, more German divisions were held down in France, just as the Red Army was hitting high gear in its most brutal offensives yet. Further Allied deception tricked Rommel into positioning most of the finest armor and best troops far away from the actual landing point. As newly appointed Supreme Allied Commander Dwight D. Eisenhower polished plans for a Normandy landing, the best Germany could throw against an attacker was waiting to the east, convinced the Allies would make a straight line from Dover to Pas de Calais. Any landings to the west, thought Rommel, were diversionary attacks to be disregarded and dealt with later.

Meanwhile, Allied round-the-clock bombing continued its relentless pounding of the German landscape. The Luftwaffe was slowly being whittled away. Though Albert Speer was achieving sinister miracles in keeping armaments production high, damage to transportation infrastructure and the massive consumption of fuel by units engaged to the south and east meant that poorly trained pilots were rising to meet Allied flyers. The few skilled German pilots left were busy testing the secret weapons Hitler was always boasting of, the weapons that in his wild inner world would turn the tide of war. Allied bombs had hindered development of his V-2, the world's first rocket weapon, with which he hoped to bring the Blitz back to London. With their debut put off by a year, the Führer instead demanded a renewed conventional bombing assault on England at the start of 1944. The Luftwaffe thus squandered precious planes on a futile "Baby Blitz", as Londoners called it. Until May 1944, a force of 500 bombers inflicted minimal damage as Allied air defenses blasted more than half of them out of the sky.

In the East, the Red Army continued slowly steamrolling over the Wehrmacht. Their 1943–44 winter offensive gave the Germans no rest. By spring 1944, Germany was in full retreat in the East. The Soviets had their choice of where to strike first. Reinforcements poured into the Red Army; its Ural industrial base, untouched by Axis assault, sent a steady stream of weaponry toward the front. The Germans in the East, on the other hand, were increasingly desperate. Reinforcements and new weaponry were being sent westward, to guard the beaches of France. Partisans roamed behind the lines freely, pinning down Nazi troops, destroying supply lines and communications. Years of slaughtering Soviet officers and starving prisoners of war had made their enemy a merciless, furious foe. No German wanted to be taken prisoner by the Red Army. It was a virtual death sentence.

In Italy, the first of the Axis nations to be invaded, the Allies saw a much slower advance. Given terrain, climate, and the proximity to the Reich itself, the German defense was more tenacious, despite the Italian populace's eager embrace of the Allied assault. The fighting was slow, torturous, and bloody, with only more devastation likely, as the Allies would slug their way up the narrow peninsula. But as Italy and her liberators looked ahead, the only thing that could shorten the bloodshed was on the horizon: the attack from the west. The time had come at last for D-Day.

D-DAY

Operation Overlord, the largest amphibious assault ever undertaken, began on June 5, 1944, during a break in an unexpected storm, which nearly forced Supreme Allied Commander Dwight D. Eisenhower to call off the invasion. Due to amazingly successful Allied deception as well as the bureaucratic stupidities and inept intelligence gathering of the Germans, the landings were a surprise.

Massive air power had been called in. For weeks, bombing runs had been softening up the coastal defenses, and surveillance flights had pinpointed the major installations. Even Arthur "Bomber" Harris put aside his usual obsession with terror bombing and committed his forces to aiding the invasion, devastating the rail lines and

infrastructure Germany needed if it was to respond quickly to the assault. Allied fighters and bombers ruled the skies: the Luftwaffe's ill-advised "Baby Blitz" had left it even weaker than it already was, and the landing sites were all within range of fighters based in England.

The Germans were taken in by almost every Allied diversion. Dummy parachutists convinced Rommel that his instincts were correct: the forces landing at Normandy were simply a diversionary attack. He refused to be fooled; his main forces, including prized panzer divisions, which might have blown the landing troops to pieces, remained to the east, and would stay there for crucial days to come. Surely the main landing would come at one of the strategic harbors the Germans held, and had built impenetrable defenses around. What Rommel didn't know was that the Allies had built two floating harbors of their own, and that these huge devices were on their way across the channel.

The key to victory was landing as many forces as fast as possible, and the Allies succeeded brilliantly. Before the Germans realized the main invasion really was happening and could get reinforcements to contain the beachheads, the floating harbors had unloaded artillery, armor, and thousands of men. Even a terrific storm's destruction of one of the artificial harbors on June 19 couldn't help the Germans. The first day's hesitations cost them the battle. Their numerical superiority in troops and armor was too slowly deployed, and their air defenses had been shattered by wave after wave of Allied planes.

Still, the destruction was terrible. The defenders gave ground grudgingly, fighting field-by-field, inflicting heavy losses on Americans in the west and the British further east. But after bitter initial fighting, by the 14th the Americans, under the colorful General George Patton, had broken through German lines and drove toward Cherbourg, which fell on the 26th. The Allies now had a true harbor through which they could pour weaponry and supplies. The Nazis had done their best to destroy the city and its harbor, but within three weeks Cherbourg was beginning to unload further invasion forces.

The Allies had firmly established themselves on the continent, though progress was slower than initially anticipated. Field Marshal Bernard Montgomery, the hero of El Alamein, the crucial battle that turned the tide against Germany in North Africa, was unwilling to take the heavy losses a major British push would entail. The Americans to the west found themselves in terrain which hindered the advance of their heavy armor. Once they attached gigantic spikes to the front of their tanks, however, they could go off road again, punching through the hedgerows of northern France and into the face of the ferociously resisting Germans.

As American armor hammered in the west, to their east, Nazi armor was doing its best to push the British back to the beaches. But from the air came swarms of Allied fighters and bombers, pinning the tanks in their positions, making movement slow and deadly. Round-the-clock air attacks from Allied planes and futile offensives had left the Luftwaffe, in the hour it was most needed, outnumbered and outgunned.

From Berlin, Hitler made a confusing situation worse, issuing contradictory orders, berating, ignoring, and overruling his generals. He refused calls for a counterattack against the menacing American armor, which threatened to buckle the entire defensive line in France. He didn't want to risk the army; instead it began to be whittled and chipped away as it was slowly pushed back, with no reserves to replace the losses.

Meanwhile, his fervent belief in his secret weapons program finally bore fruit in mid-June. The first V-1's, pilotless jet planes loaded with explosives, began falling on London. Although the appearance of these odd bombs were a blow to British morale—Churchill even demanded retaliatory poison gas attacks, but was overruled by the Americans—actual damage was nowhere near as great as Hitler envisioned. The V-1's were easily shot down, and many others missed their London target. Panic did not set in; London was not evacuated; the Allied war effort continued unhindered. Once again Douhet's predictions failed to come true. The weapons designed to suddenly win the war only hurried the Allies to break out of the Normandy beachheads to reach the V-1 launch sites.

Nazi generals finally got the hint that Normandy was, indeed, the big landing by late July and began moving their long-sidelined armor from Pas de Calais to intercept American tanks. By then the difficult terrain was behind Patton's forces, however, and open country well suited for armor was now before the audacious general. Hitler finally agreed to a counterattack at Mortain, and issued orders to strike—orders which were intercepted and decoded by the Allies, who had broken almost all the German codes and knew exactly when and where the attack was to come. Allied air power, combined effectively with the ground troops, stopped the assault in its tracks. As the Americans pummeled their attackers, the British and Canadians previously pinned down by those German troops moved south. Had Montgomery not once again been too cautious and held back his best troops, the Germans would have been trapped and annihilated in another Stalingrad. As it was, many of them escaped, although with huge losses in life and equipment. By late August, the British were clearing Belgium and capturing

the V-1 launch sites, and to the south, defying Hitler's orders to level the city, Gen. von Choltitz pulled out of Paris. On August 25, advancing American troops held back and let Charles de Gaulle's Free French forces liberate their long-suffering capital. Ten days earlier, more Allied troops had struck from the south, landing on the French Mediterranean coast. Churchill had heatedly opposed this operation, pushing instead for continued pressure in Italy. Given the choice of advancing slowly to an Alps range filled with Nazis armed to the teeth or seizing the ports of Marseilles and Toulon, Eisenhower understandably overruled the British prime minister's strategy.

The German lines were crumbling. From the Low Countries to the Swiss frontier, Allied troops were racing toward the borders of the Reich. Hitler grudgingly allowed the troops in the south of France to pull back and avoid encirclement. Almost all of France had been taken in two months' fighting. With the Nazi armies went the wartime French government based in Vichy. Coming to power through French defeat, they now faced disaster of their own as France was freed, having tied themselves to the fate of their conquerors. From southwest Germany, they watched as the Wehrmacht abandoned France and regrouped along the border, holding as many Low Country ports as it could.

That holding of ports became ever more troublesome for the Allies as 1944 progressed. While Cherbourg was slowly being cleared, other liberated ports such as Brest had been so badly wrecked by the retreating Germans that they were unusable. As Germany's supply lines shortened, lessening the strain on its battered infrastructure, the Allied lines stretched forward, with huge levels of troops, planes, tanks, and artillery to maintain. The damage they had done to infrastructure to cripple Nazi supply lines now haunted them. The only thing that helped them get as far as they did before supply became a major issue was the valiant drivers of a massive convoy of trucks laden with fuel and weapons, which came to be called the Red Ball Express. A round-the-clock substitute for the ruined rails ran nearly 90,000 tons of supplies from the landing beaches of Normandy deep into France in the space of a few weeks.

By the time the Allies were closing in on the Reich, even that fuel was running low. Patton and Montgomery bickered over who should get the last fuel reserves and push ahead. Eisenhower sided with the difficult British general, who planned to force his way across the Rhine into Holland, allowing the Allies to exploit the great harbor of Antwerp, which the British had seized virtually intact. Montgomery swung from his usual too-cautious approach to overconfidence. Ignoring warnings of strong German armor nearby, he ordered a parachute brigade dropped behind enemy lines—and on the other side of town from the Arnhem bridge the paratroopers were to seize. The Germans cut them off, drove them away from the bridge, and shot them to pieces. Only a fifth of them survived to become prisoners or escape back across the Rhine.

Surprised by the stiffening German resistance, stunned by Montgomery's defeat, and above all, desperately low on fuel, the Allied advance slowed as autumn progressed. Eisenhower had hoped for an end to war in Europe by autumn; an obstinate Reich had held out. The Allies would have to wait until spring—winter was coming, and conditions would be too poor for any major offensive on the Western front. Eisenhower's only solace was that, given the weather and the continuous beating Germany was taking in the East, at least Hitler couldn't launch any counterattacks either.

The Ardennes Offensive

Hitler counterattacked on December 16, 1944, stunning the Allies by sending forth troops and armor under cover of fog and cold. Now, with the Eastern front in collapse and his final attempts at terror bombing London out of the war proven futile, he decided on a final, furious offensive that might change the course of the war.

While on the Eastern front the amount of territory between Germany and the Soviets was ample, in the West the front was uncomfortably close to the Reich's industrial base. While there might be time to stall and regroup against the Soviets, there was little time to waste before the Allies would be in the vital Ruhr region. Thus, as entire armies were being annihilated on the Polish frontier, Hitler massed more than twenty divisions of new troops and equipment in the West, augmenting it with the last reserves of manpower he could find within the Reich. Speer had finally declared total mobilization. Now 16-year-old boys sat in the cockpits of the Luftwaffe's fighters and filled the ranks of German rifle companies.

Hitler planned to deliver a stunning, crushing blow, pushing the Allies across the Channel in a second Dunkirk. This new Blitzkrieg would undoubtedly be so successful that it would end in time to switch the forces back to the East before the Soviet winter offensive would begin. Hitler's estimation of the Allies, especially the Americans who

now made up the bulk of the force in the West, was that they were a weak-willed assembly, ready to crack with the first serious defeat. For the third time in less than fifty years, Germany planned a sudden attack through the Low Countries.

Allied intelligence summed up the Wehrmacht as a spent force, unable to muster anything beyond a tenacious but doomed defense. Over the skies of Germany, Allied bombers flew virtually unopposed, pulverizing cities with impunity. The vast resources of Ukraine and Romania were in Soviet hands; only the oil fields of Hungary remained for Hitler to draw upon. The Allied lines were drawn thin across the Ardennes forest, but could hold firm until supplies arrived and a spring offensive could begin.

It was with this mutual underestimation that the last Nazi offensive began. In cold and snow, through the heavy woods of Luxembourg and Belgium, a 400,000 man German force slammed into a front guarded by 80,000 Americans who were outnumbered in tanks and (by a more than four-to-one ratio) artillery. In the long-gone days of 1940, the attack would have waited for a clear day, so that the mighty Luftwaffe could first bludgeon the enemy from the air. In 1944, the Germans instead counted on poor weather to keep the Allied air forces' far superior strength on the ground.

The Americans were caught totally off-guard. Eisenhower scrambled to move forces to the Ardennes as two divisions were destroyed and others were pushed back toward the strategic town of Bastogne. A division of US paratroopers secured the town just in time; the Germans surrounded it but failed to take it. This slowed the advance toward the Meuse River, giving American armor time to regroup and stop the attack on the water's east side.

To the south sat the American 3rd Army. Patton had been waiting for the fuel to take his attack east into Germany. When the sudden offensive began, Allied command was alarmed at the sparse defenses in the German path, and the time it would take distant reinforcements to arrive. To everyone's astonishment, Patton promised them he could disengage in the Saar, change direction, and swing north to relieve Bastogne in 48 hours. To everyone's further astonishment, he did just that, not only getting his forces to the front but hurling them into combat against the German armor besieging the city. He smashed his way through in the face of brutal panzer counterattacks, breaking the iron ring around Bastogne and freeing the pinned 101st Airborne Division.

Despite the help Montgomery's timidity gave them, the Germans' bout of good luck came to an end on Christmas Eve 1944, when the bad weather which kept the Allied air forces grounded gave way. In the cold, clear skies over the Ardennes, over 3,000 planes took to the air, and aimed for the slowly stalling German advance. To the east, the Luftwaffe had orders to attempt yet another air offensive against the enemy. Untrained pilots with little ammunition and less fuel climbed into what was left of the Luftwaffe with visions of chasing the Allied planes (*by now outnumbering them ten-to-one*) from the sky.

So the Allies and Nazi Germany found themselves, on the Western Front, in desperate battle. Hitler was flinging his last reserves in a final assault, convinced he could sweep his enemies into the Atlantic and buy time to win in the East. Both sides prepared to throw all they had into this showdown for control of the war's direction, and perhaps its outcome. At the end of 1944, the future of the planet was being decided on the ground and in the skies above the dense forests of the Ardennes. The West had to get reinforcements to the lines before they were overwhelmed, and hopes for the weather to clear so their superior air power could be deployed.

AN INTERVIEW WITH LT. COL. MONROE Q. WILLIAMS

Lt. Colonel Monroe Q. Williams (*USAAF/USAF retired*) contacted Mad Doc Software during the development of *Jane's Attack Squadron*. Monroe fought with the 351st fighter squad of the 353rd fighter group during WWII, where he flew the P-47 Thunderbolt, and the P-51 Mustang.

All of 21 years old, Monroe Q. Williams (*the 'Q.' stands for Quitman – "an old Southern-type of name from down in Mississippi…"*) arrived in England on July 2, 1944, and was initially assigned to the 495th Fighter Training Group at Atcham for "operational training." On July 30 of that year, orders came through assigning him to combat duty with the 353rd Fighter Group, as part of the 351st Fighter Squadron. Over the course of Monroe's military career, he logged over 270 hours of combat flying time, received the Air Medal, and six Oak Clusters. Retiring from military service in 1965 with the rank of Lieutenant Colonel, Monroe then worked in the insurance industry for 24 years.

Today, at eighty years old, Monroe still leads a highly active life. Monroe flies with the 353rd Virtual Fighter Group, the only virtual fighter group in the SIM community to have a member of its WWII namesake as an active pilot. Known to his virtual group mates as 'Willy The Wolf,' Monroe can now be found attacking enemy aircraft online, where he will soon be back in the cockpit of a P-51 *Jane's Attack Squadron*.

MQW in front of his P-47

MQW climbing into his P-51

353rd Fighter Group   **351st Fighter Squad**

On February 19, 2002, Brian Mysliwy (*one of the designers here at Mad Doc*) conducted a telephone interview with Lt. Col. Williams, who now resides in Texas. Col. Williams was funny, gracious, and full of life. The ***Jane's Attack Squadron*** team couldn't have been more thrilled and honored to speak with him, and we would like to extend him a heartfelt "Thank you!" What follows are some excerpts from that interview.

ON THE GROUND

BPM: I just want to start off by saying thanks so much for getting in touch with us, and thanks for taking the time to speak with me today. It's an honor on our part to speak with you…

MQW: Well, I want to start off by saying that, Brian, I am no big hero, and [*laughs*] I was just a Mississippi country boy off a cotton farm who got drafted in the service.

BPM: How old were you when you got drafted?

MQW: Well, let's see now… October of '42… I guess I was twenty-one.

BPM: And you're brother was also in the Army with you?

MQW: My oldest brother, Clovis, and I were drafted the same day. Clovis was four years older than myself… Now, the one in between there, the one four years older than I, he volunteered the next week and tried to catch us. But he never did catch us [*laughs*]…

Clovis remained in the Army, went to France and southern Germany, driving eighteen wheelers hauling tanks and other equipment for the duration of the war.

My second oldest brother, Charles Talmadge ("Tag") Williams, four years older than I, volunteered the next week and was sent to the Army Air Corp as an Airplane Mechanic.

Yeah, [Clovis and I] were stationed seven miles apart, over there in World War II in England.

BPM: What kind of training did you have when you first went in to the Army? Did you choose to become a pilot, or is that just where they though you would fit in best?

MQW: I was drafted in, and then through a battery of tests and all that, I was drafted on in to the Army Air Corp. And that was to go to Mechanics School – B-17 Mechanic's School. While I was there, I applied for Cadets. So three days after I graduated from Mechanics School, I was on my way to Pre-Flight in Cadets.

I went through Cadets in what they call the Gulf Coast area, in Texas. I was born and raised in Mississippi, and I ended up in Amarillo, Texas for the Mechanics School. Then, when I applied for the Cadets, I just stayed down there in the Gulf Coast area.

I went through Primary Training down at Corsicana, Texas, then I went through Basic Flight Training at Greenville, Texas, and then I went to Advanced Flight Training at Eagle Pass, Texas.

BPM: And then when you were shipped over to England, you were placed with a training battalion over there as well?

MQW: Well, when they first send over the replacement pilots, they go through Atcham [Airfield near Shrewsbury, England]. It was an operation-type training program for the theatre. In other words, combat-type of operations for a period of time there. They placed the pilots where they were needed most over there. They didn't only hold them and train them, they did the placement of the pilots with the various combat outfits.

BPM: And you were assigned to the 353rd fighter group, with a P-47?

MQW: A P-47D, yeah.

BPM: And did each pilot have his own personal plane –

MQW: Yes, uh-uh –

BPM: - and you always flew in that particular plane?

MQW: Well, not always. Sometimes your plane would be in Maintenance and you would borrow somebody else's. But we had our own name on our plane…

BPM: Yours was called "Willy the Wolf," right? "Willy" being short for Williams?

MQW: [*laughs*] "Willy the Wolf," right. [*laughs*] Usually the ground crew people would have painters that would do the nose art for you…

BPM: How similar were each of the planes? If you were borrowing someone else's, would you have to learn any specific quirks about that particular plane?

MQW: No, they were all identical, as far as that goes. All of ours were P-47D's, which operated all the same. In other words, every gadget and everything was the same.

FIRST COMBAT FLIGHT

BPM: What was your very first combat flight like?

MQW: It was a little traumatic. [*laughs*] My first combat flight we went into an area over Paris. We were flying out of Rayden, which is in between Colchester and Ipswich in England, northeast of London.

We were flying into the area over Paris, and doing some strafing, and shooting anything that moves. Then we were on our way out, low on gas, and we met a group of enemy aircraft that was above us. And me being very green, I was looking for enemy aircraft, you know? Oh, I tell you, I was trying to see 'em, and trying to find 'em, you know?

They had been spotted with the flights ahead of us, and my flight leader says… "*OK boys, they're heading for the deck. Let's peel off and let's go get 'em!*" And I was sitting there still looking for airplanes, and I looked around and I was by myself. [*laughs*] Everybody was gone! And then, of course, I peeled off and went to the deck also, and I came out right over Paris, and I didn't find any more of my crew 'til I got home. [*laughs*]

I was very low on gas by this time, and then I crossed the English Channel. And my gas needle was sitting on Empty, Empty, and I mean Empty! Flying on fumes…

And there was an emergency [air]strip that had been built right on the coast of England, there, I guess for the purpose of emergency refueling. So, I landed, got some gas, and went on home.

CLOSE CALLS AND THE RESILIENT THUNDERBOLT

BPM: Though you never had to bail out, did you have any particularly close calls?

MQW: Oh, yes… [*laughs*] One of the closest calls I had, we were dive-bombing and strafing, and I was Element Lead. So you've got a Flight Leader and his wingman, and then he's got an Element Leader – the number three man – and he's got a wingman.

So we went in to dive-bomb, and we were carrying seven-second delayed bombs. And the Flight Leader and his wingman went down and dropped their bombs and peeled up. Then me and my wingman, we peeled off and went down, right down to the deck

Just as we got down to the peak, right at the bottom, the Flight Leader's bombs went off ahead of me. And I flew through just a cloud of brick, and stones, and everything… Now, that was sort of an exciting time.

BPM: I bet!

MQW: And when I come back, the old Thunderbolt had rocks sticking in between the cylinders and all, you know…

BPM: And it still was flyable?

MQW: It had a rough engine, but it flew all the way back to England.

BPM: That just goes to show you how well they were built…

MQW: Oh, yes… On another occasion, we were strafing and coming out, and a bullet came right up through the trailing edge of my wing. It knocked my aileron off! And that plane flew *very* well… [*laughs*] I even did some rolls with it to see how good it would fly without that aileron.

A HARD LANDING

BPM: What was your most memorable landing?

MQW: One of the things I remember so distinctly was that when we were in Gunnery Training, up in Mildwin, New Jersey, we would go out in flights of four and we'd shoot at these aero-targets, pulled behind another airplane.

As we came back in and landed, we always come down almost to the deck, and then peel off. Well, I was number three man, and the leader and number two man landed pretty slow, and I had to land pretty slow, and we were all on the runway.

The number four man landed real fast, and ran up my tail, and cut all the tail of my airplane off. Up into the gas tank, and cut it up, and then into the wing, and stopped the props in the wing.

COMBAT

BPM: Was there any close contact at all with the enemy? Or was it always just a nameless guy in a plane...

MQW: No, there was never any close contact with any of the enemy. I guess that is the advantage of fighting a war from the air. You cease to think of your enemies as people.

BPM: When you're in the middle of a combat situation, with everything going on around you, it must have been terrifying.

MQW: No… actually it's not. I think you're sort of conditioned. I was a football player in a little town in Mississippi there, and I played one year of college, and I liken this a lot to a good, tough football game. [*laughs*] You know what I mean? In other words, you get hyped up for it. You're not scared - but you got that same feeling almost; the adrenaline is going, and so forth. That's pretty much like flying combat…

You know how it is when you're playing the toughest game of the season, and you're going to get out there and get started, and the adrenaline is going… That's sort of like combat. You can't say that you're not scared, because everybody has some fear, but it's a matter of how you face this fear.

BPM: There must not be a lot of room for that to come in and affect you… you've got other things to deal with.

MQW: That's right. You can't afford to let the fear affect you. You're there to do a job, and you're gonna do it.

FROM FRANCE TO FLIGHT SIMS

BPM: The P-51 and P-47 had different combat roles, but many casual fans of flight sims think of them both simply as fighters. What were the differences in roles for the two, and flight characteristics? Which one do you associate yourself with more?

MQW: The P-47 and the P-51 were designed and at times used in similar roles. However, the P-47 was a much better plane for dive bombing and strafing because of its rugged build and air-cooled engine versus the P-51 with the liquid cooled engine and coolant lines running throughout the plane. Once a coolant line was hit, you are gone.

The P-51 was better for escort because of longer range and maneuverability. The P-51 is a sweeter plane to fly, so I guess I associate myself more with it than the P-47. However, for dive bombing and strafing I will take the P-47 anytime.   At the time we changed to the P-51, our primary mission changed from air to ground work to long-range escort of the bombers with an occasional strafing mission.

BPM: How did you get interested in playing flight sims?

MQW: Well, there is this website… and this fellow down in Florida was the commander of this 353rd Virtual Fighter Group; they had named it in honor of our group. And so, he asked me if I would come to [the Virtual 353rd Virtual Fighter Group's] website and make some comments about the old 353rd, and what it was like.

And I did this, we struck up more conversation, and more conversation, and he called me a couple times, and he talked me into flying.

BPM: He drafted you!

MQW: [*laughs*] **Yes! That was in August of 2000, and I've been flying with him pretty regularly now… It grows on you, and you keep getting a little better and a little better.**

And I just want to thank your company for picking up this Jane's program, and trying to rejuvenate it and rebuild it.

BPM: Well, thank you so much for taking the time to speak with me today.

MQW: I hope I could help… if I can, then that's good, because I tell you what – I had 22 years in the military, and 24 years in the insurance business, and now I just play.

BPM: Well, it sure sounds like you've earned that!

MQW: [laughs] You bet!